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ABSTRACT

The Eisenhower National Clearinghouse for Mathematics and Science Education (ENC) helps teachers by offering a broad assortment of services to enable them to quickly locate educational resources. This theme issue of the serial "ENC Focus" is designed to give educators information on curriculum resources available for teaching math and science in K-12 classrooms. This issue is organized around the theme of partnerships with business and the community. The articles provide examples of partnerships that really help teachers and students, plus ideas for making it happen in the schools. Featured articles include: (1) "The School-Business Partnership: What Can It Offer?" (Carlo Parravano); (2) "Reflections on Partnerships from a Special Education Teacher" (Jack Fink); (3) "Guidelines for Effective Partnerships" (Aleta You); (4) "National Partnerships That Can Benefit You" (Annette Thorson); (5) "Finding Prospective Partners" (J. Patrick White); (6) "The Center for Science, Mathematics, and Technology Education" (Ed Geary and Christine Jones); (7) "SWEPTs Bring Sweeping Changes" (Barbara Rodrigues, Julie Bitnoff, and I-Heng McComb); (8) "Coalitions Advance Educational Equity for Girls" (Denice Aldrich Jobe); (9) "Seeking Ways To Improve Math Achievement? Try the Mall!" (Judi Wilson and Veray Wickham); (10) "The San Diego Science Alliance: High Tech Meets High Interest" (Nancy Taylor and Joy Wochenske); (11) "How a School Partnership Broadened My Horizons" (Lawrence Woolf); (12) "Projects That Work" (Maureen P. Boino); (13) "Thirty Years and Counting" (Douglas Llewellyn and Eugene Wicks); (14) "From Flowers to Computers" (Julia W. Maccarone); (15) "Teens Take a Healthy Interest in Their Communities" (Genevieve Bardwell, Cathy Morton-McSwain, Jill Hyde, John Lewis, Priscah Simoyi, and James Rye); (16) "Local Support Provides Student Challenges" (Ray Del Greco, Bernie Durkin, and Lynn Kistler); (17) "Partnership for Lifelong Learning" (Barbara Pounders, Stephanie Sawyer, and Vicky Loggins); and (18) "Science Summer Camp for Teachers" (Jane C. Crawford). (ASK)

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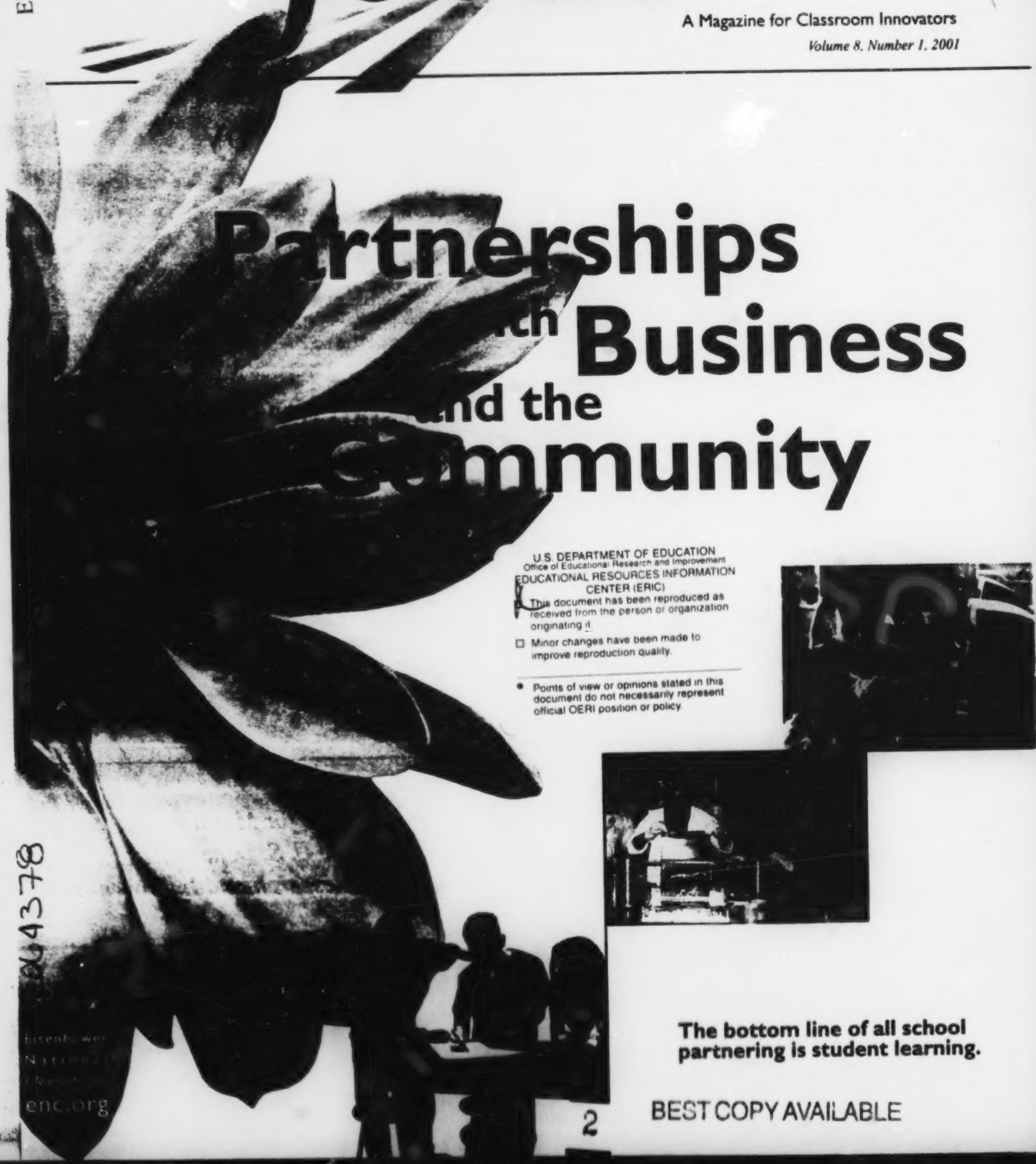

Partnerships with Business and the Community

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The bottom line of all school partnering is student learning.

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is to identify effective curriculum resources, create high-quality professional development materials, and disseminate useful information and products to improve K–12 mathematics and science teaching and learning.

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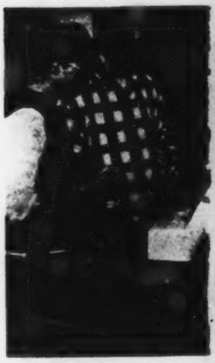

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Update . . .

Around the Clearinghouse and the Nation

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What is Eisenhower National Clearinghouse?

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Editorial

The Real Bottom Line

by Annette Thorson, ENC Publishing

"Better education is everybody's business!" proclaims Richard W. Riley, U.S. Secretary of Education, and everyone seems to be listening. Schools are getting attention from every direction: from presidential candidates to state legislators and small-town mayors, from giant corporations to local shops and businesses, from high-tech museums and libraries to faith communities operating on a shoestring…and don't forget parents!

This situation is unlikely to change. International experts on educational reform Michael Fullan and Andy Hargreaves (see box) characterize it this way:

> *With new technologies breaking down the walls of schooling, increasing cultural diversity prompting teachers to connect more with the community, and parents and corporations demanding more influence on how today's children and tomorrow's adults should be educated, it is clear that the boundaries of the school are now more transparent and permeable. The "out there" is now "in here." In times of turbulent social change, redefining one's relationship to the environment is crucial. To improve the quality of what takes place within the school, it is vital that educators pay more attention to what is happening outside it.*
> *(ENC, 1999)*

Helping you not only pay attention but also shape the relationship between your school and its environment is the purpose of this issue of *ENC Focus*.

You will find a variety of perspectives. Carlo Parravano, executive director of the Merck Institute for Science Education (MISE) and ENC Science Board member, provides an overview of roles business can play in K-12 schools (page 14), then special education teacher Jack Fink describes how MISE works for him (page 15). Nancy Taylor and Joy Wochenske describe the broad sweep of the San Diego Science Alliance (page 34), then Lawrence Woolf, a General Atomics physicist volunteering in a program within that Alliance, recounts how his participation enriches his life and work (page 34).

Douglas Llewellyn and Eugene Wicks describe a thirty-year partnership between the Rochester, New York, City Schools and the Xerox Corporation (page 37). Classroom teacher Julia Maccarone tells about three years of successful partnering that began when she asked the Home Depot across the street for flowers to help beautify her school building (page 39).

Throughout the issue, you will read about students learning in unexpected places—a shopping mall in California (page 32), a printshop in Massachusetts (page 36), an after-school program in an Alabama church (page 45), a university science lab in Pennsylvania (page 43), the sidewalks of a West Virginia town (page 40). These articles illustrate that the main point of all educational partnering is student learning. It is what our friends in business call "the bottom line."

Fullan and Hargreaves take that notion one step further when they urge teachers to "make students your prime partners." We hope as you read about the partnerships described in this issue and think of ways that you might emulate them, you will remember Fullan and Hargreaves' advice:

> *Getting "out there" doesn't and shouldn't mean abandoning your students.... Making students your prime partners...means putting them and their learning at the core of all other partnerships you build.... Involve students in their own learning, in the partnerships you build with people outside school, and in how you manage educational change. Making students your first partners is the prime directive in building all other partnerships with people "out there" beyond the school. (ENC, 1999)*

Michael Fullan, director of and professor in the International Centre for Educational Change at Ontario Institute for Studies in Education at the University of Toronto, and Andy Hargreaves, dean of the Ontario Institute for Studies in Education, believe that teachers are at the heart of all educational improvement. To guide teachers in this endeavor, they coauthored two books *What's Worth Fighting For? Working Together for Your School* (1992) and *What's Worth Fighting For Out There?* (1998), both from Teachers College Press.

JUMP ONLINE

Quotations in this editorial are from Fullan and Hargreaves' introduction to ENC's professional development project, Teacher Change: Improving K-12 Mathematics. Link to the full text of their article by visiting ENC Online (enc.org/focus/change).

ENC invites readers to contribute to *ENC Focus*: A Magazine for Classroom Innovators.

Join in the Dialogue!

Write for ENC Focus

Topics and Deadlines:

New Horizons in Mathematics and Science Education - Submissions due March 1, 2001

Learner-Centered Professional Development - Submissions due June 1, 2001

Mathematics and Science Across the Curriculum - Submissions due September 1, 2001

Topics and deadlines subject to change without notice.

See complete Writer's Guidelines on page 23.

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ENC Celebrates Your Students

"What's wrong with our schools" is a pervasive topic, but teachers tell us that they wish that someone would focus on what is right: the wonderful young people who grow in so many exciting ways right before their eyes. The Students Write series showcases the learning that happens every day in schools all over the country.

The first two entries in the Students Write series are available online in the Making Schools Work for Every Child issue (enc.org/focus/equity) and in the Mathematics and Science in the Real World issue (enc.org/focus/realworld). *Focus* writers have also occasionally sent in student writing to illustrate points in their articles. Here are just a few samples of the kinds of student writing that convinced us that Students Write should be a regular feature.

When a Project Fails

It is natural to enjoy writing about successful projects, but one teacher-contributor also encouraged his students to write about their struggles. After describing their project, this team of students relates how they faced one of life's toughest lessons:

> Unfortunately, after two years of work on our project and repeated incidents of bacterial contamination, our Biocoil had a minor, but fatal explosion. This was the final straw; we decided that our system was too vulnerable to human error, that the possibility of producing toxic algae was too high.
>
> We did not arrive at this decision lightly. It meant giving up two years of hard work to start from scratch on a new project. In the end, however, we knew it was the best decision.

Quote taken from the article "The Cascade Reservoir Restoration Project: Students Tackle Real-World Problems" by Clint Kennedy, Biology Teacher, Cascade, Idaho, High School. See the entire article online at (enc.org/focus/inquiry).

Writing About Math

In addition to describing her students' in-class reactions to Petals Around the Rose, a problem-solving game, this mathematics teacher included excerpts from their journals. The spelling errors do not detract from the students' insights:

> I like the petels around the rose. I think it's fun for now I understand it. I never taught math could be fun, I guess I was wrong. Petels around the Rose is fun, for all you have to do is count the number of dots around the dot in the middle. I taught it was hard to understand at first but now its fun.
>
> I don't know how to do Pedals Around the Rose but I'm determined to find the soloution. I think the soloution lies in the numbers 3 and 5 but I have yet to figure it out. I very am very, very, very, detirmined to find the soloution and well.

Quotes taken from the article "Petals Around the Rose: Building Positive Attitudes About Problem Solving" by Marie Appleby, Mathematics Teacher, South Hadley, Massachusetts, Middle School. See the entire article online at (enc.org/focus/inquiry)

Grappling with Big Ideas

One writer wanted to show how the use of journals challenges students to construct concepts presented in class. To illustrate, he used the following student-written journal entry about the motion of projectiles:

> ..I know that they both should hit the ground at the same time but I can't understand why they do. The one is falling straight down and is accelerated by gravity and the other one is—WAIT A MINUTE—I GET IT! THEY ARE BOTH BEING PULLED BY GRAVITY! THERE IS NO ACCELERATION HORIZONTALLY! Now I understand! I guess it's not that difficult after all...

Quote taken from the article "Assessing Student Learning—and My Teaching—Through Student Journals" by Bill Heinmiller, Physics Teacher, Westerville, Ohio. See the entire article online (enc.org/focus/assessment).

Send in Your Students' Work!

ENC would like to feature your students' writing. For the Students Write series, we are looking for student work that demonstrates their involvement in mathematics, science, and/or technology. Please include a brief introduction putting the work in the context of your classroom. Student artwork increases the likelihood of publication, but we can return it only if you provide a self-addressed, stamped envelope of adequate size. Please be selective; students can help evaluate their peers' work and choose the best for submission.

Submit electronically by attaching files to
email: athorson@enc.org

Or mail to:
Editor, ENC Focus, 1929 Kenny Road, Columbus, OH 43210-1079

For more information about writing articles for upcoming issues of *Focus*, please see page 23.

Quick links to all the web sites mentioned in this article and throughout the magazine are available at enc.org/focus/partners

Educational Development Center

This organization collaborates with ENC and others to improve education in the United States and around the world.

by Judy Spicer, ENC Instructional Resources

The Educational Development Center (EDC), a nonprofit company that designs educational tools and systems, sponsors more than 325 projects around the globe and across the life span—from early childhood development to professional development and job training, from elementary school science and mathematics to adult literacy. Based in Newton, Massachusetts, EDC was founded in 1958 when a group of scientists at the Massachusetts Institute of Technology joined teachers and technical specialists to develop a new high school physics curriculum, PSSC Physics. EDC brings its years of experience to its current collaborations with teachers, scientists, mathematicians, and technology specialists to develop new and effective approaches to content, instruction, and assessment.

Quick links to all the web sites mentioned in this article and throughout the magazine are available at enc.org/focus/partners

Recently, ENC compiled a list of mathematics resource materials from the ENC collection for use in conjunction with MathPartners, an EDC project funded by the National Science Foundation. MathPartners provides reproducible mathematics activities in support of the AmericaCounts initiative (www.ed.gov/americacounts). Available online, the materials are intended for use by mathematics tutors working with students from kindergarten through grade 9. In addition, training materials—both print and video—are available to help program coordinators prepare the tutors (www2.edc.org/MathPartners).

At EDC's web site (www.edc.org), users can locate projects that are relevant to particular interests. Highlighted here are several EDC projects that support mathematics and science education.

EDC K-12 Science Curriculum Dissemination Center

This project is part of a nationwide effort to introduce school districts to exemplary science instructional materials developed with funding from the National Science Foundation. Through 10 regional hubs across the country, the Center will offer seminars, on-site consultation and technical assistance, planning tools, and a wide range of resources to an estimated 375 to 500 previously underserved communities (www.edc.org/CSE/projects/k12dissem/k12dissem.html).

Developing Mathematical Research Skills

EDC is creating a set of web-based materials designed to give secondary students a mathematics research experience. The project involves students in working on a difficult problem over time, developing their own models, experimenting, conjecturing, proving results, and extending the problem. Mathematicians will serve as electronic mentors for students and teachers participating in the project (www.edc.org/LTT/DMRS).

Project ASSIST

Project ASSIST (All Students in Supported Inquiry-based Science with Technology) is a program created in collaboration with the Cambridge, Massachusetts, Public Schools. The program provides high-quality science curricula supported by technology to teachers working with students with disabilities. Elementary classroom teachers, science staff development teachers, special educators, and technology specialists work together to develop science lessons and assess the progress of students with and without disabilities. The project is nationally disseminated through a web site and print publications (www.edc.org/ARProcess).

K-12 Mathematics Curriculum Center

EDC provides a variety of services and products to support school districts around the country as they select and implement standards-based mathematics curricula. The program covers a variety of issues—transitions across grades K-12, professional development, and building support for curriculum change. Resources include a series of seminars; print materials, including a curriculum selection guide; case materials; and a web site (www.edc.org/mcc).

Mathematical Methods in High School

EDC is developing mathematics curriculum materials for the third and fourth years of high school, providing teachers and students with experiences that exemplify mathematical ways of thinking. The philosophy is that a mathematics course is not just a vehicle for communicating established results and methods; it is also an opportunity to develop the habits of mind necessary to create those results and use them successfully (www.edc.org/LTT/M2HS).

Schools Around the World (SAW) Technology Pla

SAW is a multinational, systemic professional development model that uses world-class standards as the basis for improving student achievement. The program relies heavily on web-based technology that allows teachers to share their work. SAW gives teachers the opportunity to go beyond the results of the Third International Math and Science Survey (TIMSS) to learn what is expected, taught, and achieved in other countries (www.edc.org/CCT/SAW2/content/index.htm).

Eisenhower Mathematics & Science Network

ENC is part of the Eisenhower Mathematics & Science Network, a nationwide collaboration that provides support to mathematics and science educators across the country. In addition to ENC, the Network includes ten Eisenhower Regional Consortia that work toward these goals:

- To identify and disseminate exemplary mathematics and science instructional materials;
- To provide technical assistance to educators in implementing teaching methods and assessment tools;
- To collaborate with local, state, regional, and national organizations engaged in educational improvement.

Also part of the Network are 12 ENC Demonstration Sites—one in each region, one at ENC in Columbus, Ohio, and one at The George Washington University in Washington DC. These sites provide users with the opportunity to access ENC services electronically and to pick up free publications.

In recent years, the Network has spread even further with the creation of ENC Access Centers. Located throughout the country, these volunteer centers are staffed to distribute ENC publications and to teach local educators about the Network. There are already 150 Access Centers, with more added each month. See page 13 for a description of one Access Center in the Network.

Contact the Eisenhower Consortium or ENC Demonstration Site that serves your state for assistance in improving mathematics and science education.

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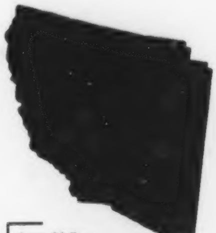

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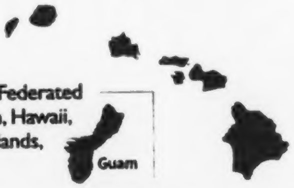

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North Central Region
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consortium

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Mid-continent Region
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Southwest Region
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consortium

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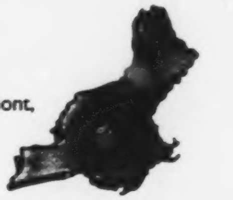

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Using the Internet

WebQuests for Science and Mathematics

Using WebQuests with students is one of the best ways teachers can take advantage of the Internet as a powerful teaching tool.

by Kimberly S. Roempler, ENC Instructional Resources

In this column in the last issue of *ENC Focus*, Judy Spicer described the use of virtual manipulatives in the middle school mathematics classroom. Found on the Internet and in educational computer software, virtual manipulatives demonstrate mathematics concepts in ways not possible with physical objects. Teachers who use them are taking advantage of one of the greatest strengths of the computer as a tool for learning.

The same can be said for WebQuests. "A WebQuest is an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the Internet" (Dodge, 1995, edweb.sdsu.edu/courses/edtec596/about_webquests.html). The amount of information provided through the Internet is unprecedented. WebQuests help students make sense of all that information, compelling them to ferret out relevant information, come to conclusions, and think for themselves.

Asking the Question/Setting the Task

WebQuests start with an interesting, meaningful, real question or task. (What a novel idea!) It can even be a question generated by students themselves, such as "What is the best roller coaster in the United States?" or "What city has the best weather?"

The question that starts the DNA for Dinner? WebQuest is "Should genetically engineered food crops be specially labeled for consumers and why?" Students work together to answer this meaningful question. There are no simple yes or no answers. WebQuest tasks should generate higher-order thinking: debating, comparing, analyzing, hypothesizing, and proposing solutions.

To engage students in these kinds of intellectual activities, WebQuests use scaffolding or prompting, which has been shown to facilitate more advanced thinking. In other words, by breaking the task into meaningful "chunks" and asking students to undertake specific sub-tasks, a WebQuest can step them through the kind of thinking process that expert investigators would typically use. Until the advent of the World Wide Web, this kind of activity was very difficult for the classroom teacher to create because collecting such a breadth of resources was next to impossible (Dodge, 1995).

Collecting Evidence and Analyzing Data

To perform the tasks set up in a WebQuest, students use all the resources of the Internet—email, chatrooms, and listservs as well as web sites—to connect to experts and data in the real world. Many times students are asked to collaborate with each other to collect evidence.

Roempler's Recommended Resources

Professional Development

- **The WebQuest Page** is designed to serve as a resource to those who are using the WebQuest model to teach with the web. edweb.sdsu.edu/webquest/webquest.html
- **WebQuest Taskonomy: A Taxonomy of Tasks** describes types of tasks that can be asked of students and suggests ways to optimize their use. edweb.sdsu.edu/webquest/taskonomy.html
- **WebQuests for Learning** provides an introduction to why we should use WebQuests. www.ozline.com/webquests/intro.html
- **Some Thoughts About WebQuests** describes the critical attributes of a WebQuest, steps to designing your own, and examples. edweb.sdsu.edu/courses/edtec596/about_webquests.html
- **WebQuest Templates** provide an easy way to get started in creating your own. edweb.sdsu.edu/webquest/LessonTemplate.html
- **A WebQuest about WebQuests** asks educators to work in teams to examine five WebQuests from four different points of view. There are two versions, elementary (edweb.sdsu.edu/webquest/webquestwebquest-es.html) and middle school/high school (edweb.sdsu.edu/webquest/webquestwebquest-hs.html).

Science WebQuests

- **BatQuest: In Search of Stellaluna** contains explorations and activities that are integrated with the book *Stellaluna* by Janell Cannon. The site invites visitors to help Stellaluna learn about bats. Students can learn about the different types of bats, their care of their young, and how echolocation works. Students can also learn about unique bat characteristics and why bats are important. (Grades 2-3) projects.edtech.sandi.net/chavez/batquest/batquest.html
- **Prisoners or Protected? A WebQuest Exploring the Humanity of Zoos** asks students to think about several different aspects of zoos. Students make decisions about whether zoos are humane to animals and whether keeping animals in captivity for human entertainment is a good thing to do. Students will also look at different features of zoos and choose which features they think are the best suited to animal species. (Grades 5-8) www.richmond.edu/~ed344/webquests/zoos
- **Planet Earth: A Suite of Interactive Learning Activities in Ecology** includes the WebQuest **Conflict Yellowstone Wolves**. Students are challenged to

Often WebQuests require that students conduct their research from the perspectives of individuals with different points of view. For instance, in the Prisoners or Protected? WebQuest, students role-play animal rights activists, habitat experts, zoo evaluators, and zoologists. Students are directed to resources that would be appropriate for their assigned role model and are then asked questions pertinent to that person.

In the Best Weather WebQuest from the Math WebQuest site, groups are first asked to define "best weather." Students then select five cities and collect data from national weather websites. These data are analyzed a variety of ways.

Presenting the Answer

The answer or solution that student teams develop in response to a WebQuest should be posted, emailed, or presented to real people for feedback and evaluation. In the DNA for Dinner? WebQuest, students are asked to perform three tasks: draft a law that addresses labeling genetically engineered food in the United States, present the proposed legislation to classmates, and email officials in the state or federal government to let them know what kinds of legislation they should be considering.

When students role-play, they have to present their case from the perspective of the individual they are representing. In the Prisoners or Protected? WebQuest, the animal-rights activists present arguments against zoos. The habitat experts defend why they support the continuation of zoos. All students then work together to create a zoo.

Link to all the web sites mentioned throughout this magazine via the online version (enc.org/focus/partners).

Accessing Technology

Perhaps the greatest obstacle some teachers will face in implementing WebQuests in their classrooms relates to the technology. I suspect that few teachers have the perfect set-up. Schools with lots of computers may not have fast access to the Internet. Or maybe access is fine, but the computers run older versions of web browsers. Or maybe your school doesn't even have an Internet connection and you're doing all your web navigation at home.

In his WebQuests for Learning web site, Tom March provides some direction on how to incorporate WebQuests into your teaching. He considers various situations—classrooms with no computers, those with one computer but no Internet access, those with one computer with Internet access, and those with just a few computers.

Choosing a WebQuest

I started searching ENC Online's Curriculum Resources database (enc.org/resources/search) to see what WebQuests ENC's science and math content experts had chosen for the ENC collection. I was surprised at the small number of WebQuest sites we linked to.

I then used search engines such as Google.com to search the World Wide Web. I still didn't find a wealth of excellent WebQuests. Many of the sites labeled "WebQuest" reminded me of the sets of fact questions that used to be found at the end of textbook chapters.

The few excellent WebQuests found in the ENC collection and in my own Internet search are listed in the Recommended Resources below. Perhaps more valuable are the sites designated as Professional Development because these will help you create WebQuests tailored to the needs of your students. A carefully designed WebQuest is an excellent learning tool that truly makes the most of the strengths of the Internet. It is well worth the effort to develop your own.

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develop a solution to the heated debate on reintroducing wolves into Yellowstone National Park. Students analyze the problem, and draw their own conclusions. Students are assessed on how well they support their conclusions and communicate and collaborate with peers. Their final task is to write a newspaper editorial to the people involved. (Grades 5-9) powayusd.sdcoe.k12.ca.us/mtr

- **DNA for Dinner?** introduces students to the mechanics and societal implications of the genetic engineering of plants grown for human consumption. The site also encourages students to learn about public policy and shows how ordinary citizens can become part of the decision-making process for issues that are important to them. (Grades 9-12) www.gis.net/~peacewp/webquest.htm#Introduction

Mathematics WebQuests

- **Connections for the Future** features seven WebQuests in which students use web resources to obtain data that are then analyzed and used to answer questions on such topics as basketball statistics and world travel. WebQuest topics include basketball statistics, financial planning for a trip, and U.S. population statistics. (Grades 6-12) www.wfu.edu/~mccoy/NCTM00
- **Math WebQuests: Continuing Our Journey Through the Information Highway** introduces the instructional technique of a WebQuest to elicit higher order thinking. Students are expected to use problem solving, reasoning, communication, connections, and representation process skills as they develop an understanding of data collection and analysis. (Grades 4-12) www.wfu.edu/~mccoy/NCTM99
- **The Titanic: What Can Numbers Tell Us of Her Fatal Voyage?** gives students the opportunity to do statistical research using links to a database of the crewmembers and a database of the passengers of the *Titanic.* (Grades 9-12) asterix.ednet.lsu.edu/~edtech/webquest/titanic.html

WebQuests for All Disciplines

- **Matrix of WebQuest Examples** provides a variety of WebQuests organized by level (K-3, 4-5, 6-8, 9-12, College) and by type of task. edweb.sdsu.edu/webquest/matrix.html

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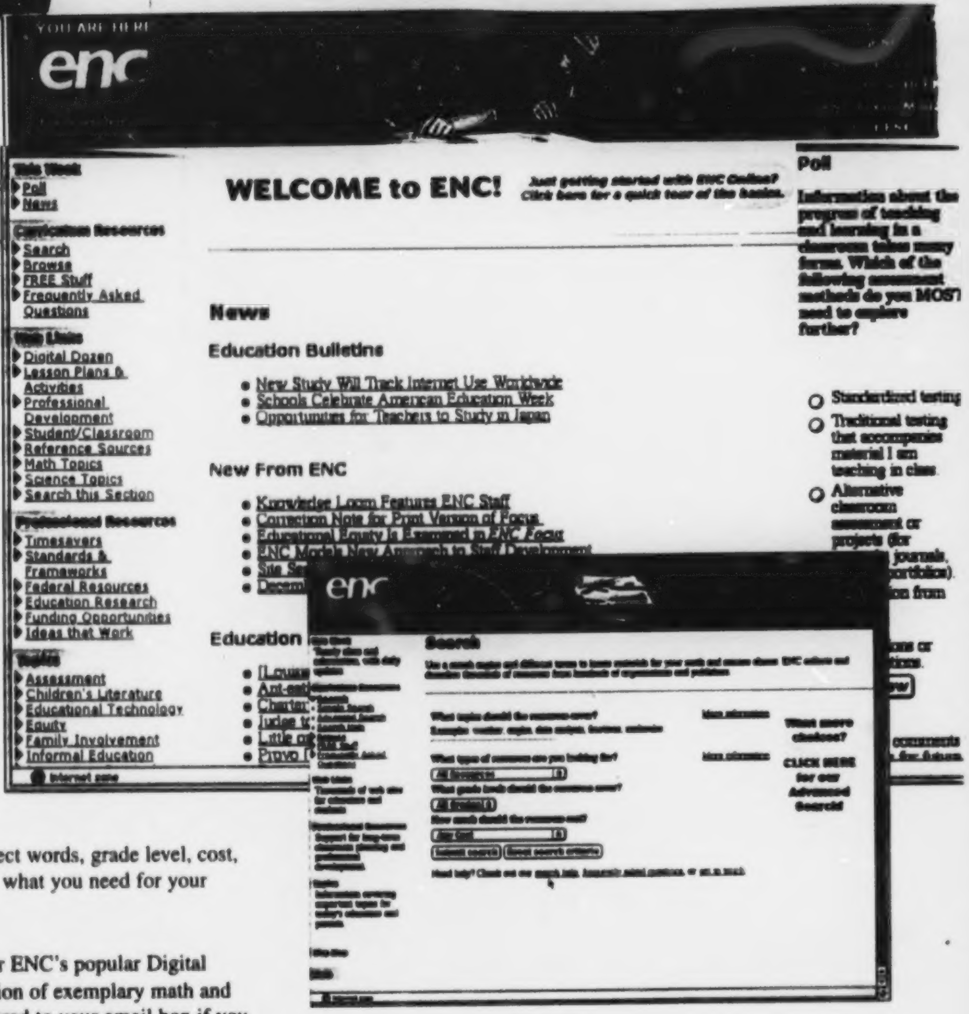
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News

Education Bulletins

- New Study Will Track Internet Use Worldwide
- Schools Celebrate American Education Week
- Opportunities for Teachers to Study in Japan

New From ENC

- Knowledge Loom Features ENC Staff
- Correction Note for Print Version of Focus
- Educational Equity Is Examined in *ENC Focus*
- ENC Models New Approach to Staff Development

Poll

Information about the progress of teaching and learning in a classroom takes many forms. Which of the following assessment methods do you MOST need to explore further?

○ Standardized testing
○ Traditional testing that accompanies material I am teaching in class
○ Alternative classroom assessment or projects (for

ENC Online is designed to make the resources of the Eisenhower National Clearinghouse available to educators everywhere all the time. Here is a quick introduction to the site. We urge you to "jump online" and discover for yourself how helpful enc.org can be to you.

Curriculum Resources. In this area of the site, you can use a simple or advanced search to locate all types of teaching materials in ENC's collection of more than 17,000 items. The searches allow you to choose particular subject words, grade level, cost, and type of material to find exactly what you need for your classroom situation.

Web Links. Check this category for ENC's popular Digital Dozen feature. This monthly selection of exemplary math and science web sites can also be delivered to your email box if you choose to register. Web Links also connects to hundreds of sites with math and science lesson plans. A search feature helps you find Internet resources quickly and efficiently.

Professional Resources. This portion of the site is designed as a teachers' professional support system. ENC has gathered some of the most popular professional resources in one Timesavers area for quick linking and use. This section also provides links to the national mathematics and science education standards, and state frameworks are listed conveniently by state. Federally funded resources and professional development strategies are also available here.

Topics. Hundreds of articles, teacher interviews, and selected curriculum resources and web sites are arranged thematically in this area. Topics include inquiry and problem solving, educational technology, equity, and assessment. Many of these topics include the content developed for *ENC Focus*.

ENC Online also has a quick way to get to the full text of each issue of *ENC Focus*—try the ENC Focus Magazine area of the web site. In this area, you can also sign up for a free subscription to all future issues of the print magazine.

Timely Resources

ENC's web site and publications provide this staff developer and her colleagues fingertip access to a vast, organized collection of resources for professional development.

by Iris B. Hubbard,
The University of Tennessee at Martin

The Center of Excellence for Science and Mathematics Education (CESME) at the University of Tennessee at Martin works with math and science educators throughout the state to research best practices, to locate and develop resources that support the state curriculum frameworks, and to provide opportunities for professional development. ENC's resources are a perfect fit with our mission. Through the UT Martin/CESME ENC Access Center, we are able to share ENC products with both inservice and preservice teachers and other educators.

ENC Online (enc.org) saves us many hours in our searches for up-to-date, standards-based resources. When I prepare electronic bibliographies of Internet sites, I always include enc.org. Just recently, ENC Online was one of the beginning points in a two-week teacher institute where we compiled resources for research-based intervention/remediation programs in algebra.

Although I have enjoyed many ENC publications, the most recent *ENC Focus* magazines have been especially useful and timely. Each issue has been appropriate for professional development activities we were planning just as it arrived. For example, while one of my colleagues was planning a GLOBE train-the-trainer workshop, the Mathematics and Science in the Real World issue arrived chock full of related resources and even an article describing the GLOBE project!

Each *Focus* issue is a great blend of classroom applications, Internet and commercial resources, and discussions of issues. Many *Focus* articles have been used effectively in jigsaw activities to stimulate teacher discussions and to set the stage for workshop activities. For example, teachers enthusiastically played Petals Around the Rose (*ENC Focus* on Inquiry and Problem Solving) during a recent professional development series held at four locations across Tennessee. The Assessment That Informs Practice and Integrating Technology in the Classroom issues were included in another recent CESME workshop, Technology for Teaching and Assessing Math Concepts in Middle Grades.

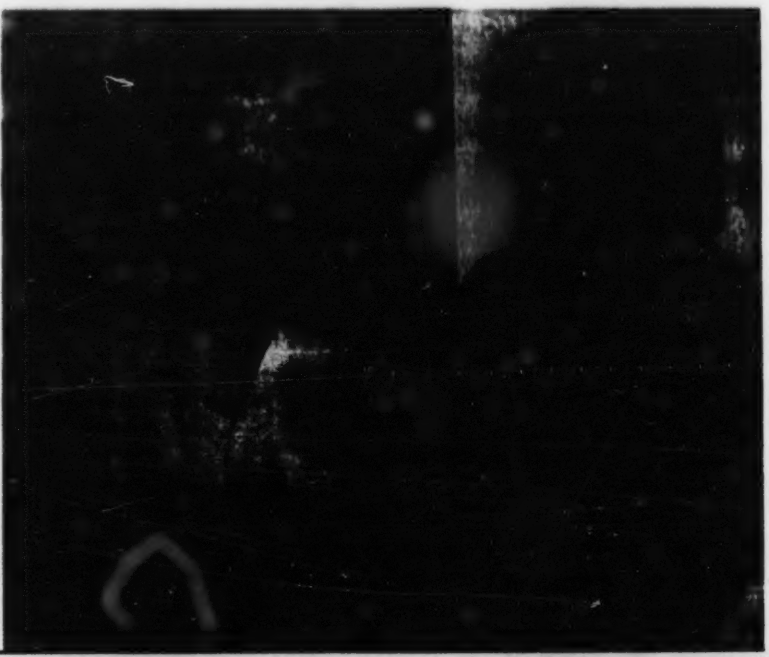
The Reality of Change issue of *Focus* and two other ENC publications, *Ideas that Work: Mathematics Professional Development* and *Ideas that Work: Science Professional Development*, were shared with administrator-teacher teams from across the state during a two-day Tennessee Department of Education institute. The teams focused on planning school-based professional development as part of their school improvement plans. Participants especially mentioned that the strategies and examples in the two *Ideas* publications were new and practical information.

One of the aspects of the ENC publications that I personally enjoy is the opportunity to grow professionally myself as I read perspectives of teachers and other educators from beyond Tennessee. Also, I appreciate the expertise and dedication of the ENC staff who compact so much quality information into publications I have time to read!

In addition to serving as the CESME Mathematics Education Coordinator at The University of Tennessee at Martin, Iris Hubbard is the CESME/UT Martin ENC Access Center Director. Contact her via email ihubbard@utm.edu For more information about the CESME, visit the web site (cesme.utm.edu).

All of the publications described in this article are available online (enc.org). *Ideas that Work: Mathematics Professional Development* and *Ideas that Work: Science Professional Development* are also still available in print and can be requested online or via email (editor@enc.org) or by calling toll-free (800) 621-5785.

Iris Hubbard (right) assists a visitor to the ENC Access Center she directs.



Focus on

Partnerships with Business and the Community

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The School

This educator and executive director of a major corporation's educational partnership program describes the different roles business can play in K-12 schools.

by Carlo Parravano, Merck Institute for Science Education, Rahway, New Jersey

"Write a check and get out of the way!" That's the answer some school administrators give me when I ask them how a partnership with business might be most helpful to their districts.

As an educator who has worked on both sides of school-business partnerships, I understand why educators are tempted to think this way. In the worst-case scenario, a well-intentioned business without educational expertise can cause more harm than good. Fortunately, we can point to many successful relationships between businesses and public schools—relationships where getting out of the way would be irresponsible and wasteful.

Although schools and businesses are very different types of organizations, schools can learn important lessons from successful businesses and have compelling reasons to want to do so. Corporations with a good track record over the long haul have had to adopt strategies for survival—and for success—that can teach us about adapting to change, strategic planning, and the importance of investing in employee development.

Businesses also have an obvious interest in education. The need for a highly trained and well-educated workforce has never been greater, and more businesses are beginning to understand that they can play a role in reaching this goal.

Commitment Comes First

Merck & Co., Inc., one of the world's leading developers of health products, has a long history of supporting education. For decades, Merck has provided schools, colleges, and a variety of education programs with contributions, grants, and the time and talent of its employees.

Ten years ago, Merck management decided that a more focused and long-term commitment of resources was required. Out of this commitment was born the Merck Institute for Science Education (MISE), a not-for-profit organization with a mandate to improve science instruction for students in kindergarten through grade 8.

MISE formed partnerships with public school districts in four communities where Merck has major facilities: Linden, Rahway, and Readington Township in New Jersey and North Penn in Pennsylvania. Because we believe that teachers are the single most important school factor in improving student

Business Partnership: What Can It Offer?

performance, MISE programs focus on professional development and other kinds of support for the classroom teacher.

With the formation of MISE in 1993, Merck set aside 10 years of funding, thereby acknowledging the challenges inherent in this work. Slightly more than halfway through the

Continued page 16

Reflections on Partnerships from a Special Education Teacher

Science for all students is one of the benefits of the business partnership at work in this teacher's school.

by Jack Fink, Gwynedd Square Elementary, Lansdale, Pennsylvania

Ask me why I favor the partnership that the Merck Institute for Science Education (MISE) has forged with my district, and I will tell you it is because they understand the need to educate all students.

I teach in an early intervention program for students in kindergarten through grade two who are at least three years behind in language development. My students have difficulty understanding language and expressing themselves even though they have no hearing loss, no social or emotional disability that would delay language acquisition, and no physical impairment related to speech. They are of average cognitive ability as indicated by one or more performance measures. In short, there is nothing in their emotional or intellectual makeup that prevents them from becoming good students.

Nevertheless, before our district's partnership with MISE, nobody ever thought about teaching special education students challenging content in science or math. My school had science kits, but none were provided to teachers of special education classes. And nobody ever thought of guiding special educators

Continued page 17

process, we must now confess that it is just as difficult as we believed it would be. At the same time, we can claim some successes that renew our determination. (See the accompanying article by classroom teacher Jack Fink.)

Roles for Business

How might a business partnership help your school district? Being a source of funds is clearly a legitimate role and probably the first that comes to mind. In many communities, schools find that they cannot support innovative work by relying solely on public funds. Businesses and other organizations are often in a position to provide instructional materials and to support professional development in public schools.

Businesses are often able to leverage additional resources that might not be available to a school district by itself. As an example, in 1996, MISE and its partner districts were awarded a five-year, $2.4 million grant from the National Science Foundation to further their work in professional development. This grant also provided funds for materials and new programs in assessment.

Businesses also can play other roles. Among them:

Advocate. Using the prestige and credibility of their corporate voices, businesses can be powerful advocates for local initiatives. In some cases, they can become involved in the day-to-day work of policy development at the state and national level. Several years ago, MISE staff served on the committee that developed New Jersey's science curriculum standards. MISE staff now is involved in the development of professional teaching standards for the state's teachers.

Researcher. Businesses use data to evaluate their success, and a growing number of high-performing school districts are doing the same. Because Merck is a company of scientists, we have approached our partnership with school districts as a scientific investigation. MISE contracted with an outside evaluator, the Consortium for Policy Research in Education (CPRE) at the University of Pennsylvania, to benchmark and report annual progress in the schools. We and our partner districts use this information not only to help us understand the results of our work but also to guide us as we make mid-course corrections.

Anchor. School districts, as public entities, experience frequent changes in leadership. At times, teachers may find themselves under political pressures that can get in the way of their primary mission of educating children. In such a situation, businesses can be anchors of stability. MISE has helped districts weather disruptive change by supporting teachers and school leaders committed to a common vision of educational excellence.

Coach. Strategic planning is key to any business plan and is another area in which schools can benefit from corporate experience. Several years ago, we worked with our partner districts as they adopted an annual planning process for science education. When developing their plans, the districts now focus on five critical areas: curriculum and instruction; professional development; student achievement and participation; district policies and practices; and parent and community support.

Broker. Businesses can help link schools to sources of expertise on both the regional and national levels. MISE has introduced its partner districts to the thinking and resources of many important players in the science education community, including the National Science Resources Center, the Lawrence Hall of Science at the University of California, Berkeley, the Educational Testing Service, and the Education Development Center. (Editor's note: see ENC's Partners, p. 7.)

Measuring Results

The different roles, perspectives, and resources that businesses can bring to the task of educating children are important, but ultimately results are what really matter. Just past the midpoint of our 10-year initiative, CPRE, our outside evaluator, is telling us that the work is taking hold.

The percentage of teachers in the partnership districts who have voluntarily participated in our professional development programs has approached the 80 percent mark we set for ourselves a while ago. Even more encouraging, CPRE says there is evidence that when a critical mass of teachers in a school participate in the professional development and begin to change their practice, the practice of nonparticipants begins to shift in the same direction.

Further, a culture of adult learning is becoming embedded in the districts where we work. Most of our partnership districts have now committed resources to support full-time professional development specialists.

Science has become a priority in our partnership schools. Administrators and teachers regard science instruction as a core subject with the same prominence as language arts, mathematics, and social studies. The science curriculum is based on national standards. We also see good articulation across the grades—a logical sequencing of science instruction from the elementary to the middle schools.

In addition, our partnership districts recognize the importance of valid and useful assessment. After much work, we are beginning to come to consensus on a multi-component assessment strategy, since we now realize that no single instrument can adequately measure student performance. This past year, new assessments have been piloted and administered in the districts.

Of course, the most important goal is to improve learning. CPRE has determined that students who received science instruction over several years from teachers who participated in MISE professional development outperform students taught by non-participants. "These data suggest that, in the long run, as more and more teachers participate . . ., there will be a positive and significant impact on student performance in science," CPRE writes in the most recent analysis of our program.

Business partnerships can make a difference in public education. The difference begins with funding but it goes much further. With vision, good planning, and effective communication, school-business partnerships can be a win-win proposition for all stakeholders, foremost among them our teachers and students.

Carlo Parravano is the Executive Director of the Merck Institute for Science Education. Prior to joining Merck in 1992, he was Professor of Chemistry at the State University of New York at Purchase and Director of the Center for Mathematics and Science Education of the SUNY Purchase/Westchester School Partnership. Among his many professional activities, he serves on ENC's Science Advisory Board.

Reflections on Partnerships from a Special Education Teacher (continued)

in methods of teaching science to exceptional students.

The partnership promotes the notion that science can be accessible to all students. MISE staff members, who provide partner school districts with technical assistance, use inquiry-based learning to make science content interesting. While some people believe that special education should focus primarily on teaching basic skills, MISE sees that using the process of a scientific investigation really is a basic skill.

It also happens that the inquiry approach is very beneficial to my students' language development. They are encouraged to (1) ask a question, (2) make a prediction, (3) devise a plan, (4) check it out, and (5) report their findings. All involve language.

Last year, for example, the class was studying physical properties of various objects. One of the activities required that students distinguish between things that stack and things that roll. Many of my students didn't know the meaning of "stack" and "roll," so we stacked all sorts of things, including our chairs and desks, and then we went outside and we rolled down a hill. When everyone understood the language concepts, they were ready to work with objects in the science kits and classify them as stackers or rollers.

I became a Leader Teacher through MISE's intensive three-year professional development program. The invitation to participate was extended to special education teachers as well as regular classroom teachers, and I jumped at the opportunity because I recognized that this approach would hook into my students' strengths.

Thanks to the work of the partnership, my students today follow the same K-1 science curriculum that is used in regular classrooms. The MISE program moves my students from "hands-on" to "minds-on" learning. Whereas some simple hands-on exercises may require students to do little more than follow directions, the inquiry approach uses the materials to engage students in science investigation. My students generate questions to begin the inquiry, and they often go beyond the stated objectives of the science kits.

The same process of inquiry can be applied to other disciplines such as mathematics. We are always making predictions, always making plans and generating hypotheses. The kids understand the language of inquiry, and it really helps their learning. These are skills that will serve them well in all their future learning, both during their school years and beyond.

Jack Fink is a special education teacher in the North Penn School District in Montgomery County, north of Philadelphia. In 1992, he developed the communication support program described in this article. The early intervention program currently serves students drawn from all 13 schools in the district.

Guidelines for Effective Partnerships

Here are some practical suggestions for developing partnerships that promote educational reform in mathematics, science, and technology.

by Aleta You, Rutgers, The State University of New Jersey

According to the Committee for Economic Development, in the late 1990s there were more than 140,000 academic-corporate partnerships in 30,000 elementary and secondary schools (Segal, 1992, p. 72). Partnerships between K-12 schools and such organizations as business and industry, institutions of higher education, and community groups have the capacity to enrich and strengthen mathematics, science, and technology education in the classroom.

Such collaborations also bring to the schools a variety of human, technical, and financial resources that benefit teachers, administrators, and students. Partnerships can also play a "vital role in translating standards, frameworks, and assessments from the realm of abstract principles to the world of actual classroom practice. . . ." (Sussman, 1993, p. 13).

Guidelines

In my work with a variety of state, county, and local partnerships over more than a decade, I have observed that successful partnerships have common characteristics that can serve as guidelines to others.

✓ Aim for a long-term relationship.

Many businesses are looking for lasting ways to improve their communities. School districts can reach out to these interested groups by establishing an education foundation with an advisory committee comprised of key business leaders, teachers, parents, and administrators. The advisory committee could conduct a needs assessment and set priorities. The key to initiating a partnership is to get the major stakeholders involved in the decision-making process.

✓ Get top-level commitment.

The approval of all parties involved is critical if a school-business partnership is to get off the ground. On the school side, that means teachers, principals, superintendents, and school boards. Similarly, the chief executive officer and the community affairs coordinator or public relations director of a company must be committed to the development of a partnership with a school district. In addition, businesses need to be aware of "what's in it for them." The priorities established by the school district need to match the priorities of the corporation or business if the partnership is to be successful.

✓ Decide on goals.

In the initial meeting, the focus should be on ways the schools and businesses can work together to meet mutually desirable goals. Be cautious in opening a discussion about money. Some companies may have a history of financial contributions, such as grants, and will expect to discuss money from the outset. Other organizations will be more interested in providing services, human resources, or release time for staff to tutor or serve as mentors.

✓ Look for partnering opportunities that fit your situation.

Even if there are no large employers in your district, you can still look for partners among small, locally owned stores and enterprises. Small or isolated districts can join with other districts that have access to a greater number of potential partners.

Sometimes partners can be identified when teachers survey their classes for the names of parents who are willing to come to school and talk about their careers. Teachers could also use the survey to identify what resources or services could be provided by their students' parents or by the parents' employers.

✓ Be flexible.

Businesses and schools represent two different cultures. Language, time, legal constraints, and the needs of constituents vary considerably between the two groups. Businesses often focus on the "bottom line" and may not fully understand the myriad pressures that schools face.

A third-party facilitator, such as a parent, a Chamber of Commerce representative, a school district coordinator, a member of a not-for-profit agency, or an institution of higher education may be helpful in setting up a series of meetings to ensure that all points of view are being heard. The development of mutual trust and respect is essential if a partnership is to be sustained over any length of time.

✓ Build on little successes and publicize your efforts.

It is important to plan activities on a small scale that will yield positive results. Publicizing your partnership through the local newspaper or district newsletter will serve to highlight your efforts and will also give visibility to the business as a contributing member of the local community.

What may initially start off as a small-scale partnership may eventually build into a larger enterprise. Somewhere down the line, funding may be available to expand and sustain a partnership. There is also the possibility that as businesses become more involved, school districts will see higher success rates in passing school bond issues or other issues on the ballot.

✓ Provide adequate time for planning.

A series of meetings will probably be required to assess needs, prioritize goals, and map out specific activities.

✓ Put goals, objectives, projects, and timelines in writing.

Having a clear, well-articulated set of benchmarks, strategies, and outcomes will keep the partnership focused and on task.

✓ Assign a staff person or outreach coordinator to develop partnerships.

Another option is released time for a classroom teacher or administrator to work on partnerships between the

Partnerships in Action

Tech Corps

This national nonprofit organization was formed in 1995 to support the development of technology infrastructure in the schools. Thousands of technology professionals volunteer to put new technologies to effective use in schools across the nation. For example, state affiliate Tech Corps New Jersey works with Prudential Insurance Company, KPMG, Verizon, the New Jersey State Chamber of Commerce, and dozens of its member companies throughout the state to link schools in need of assistance with volunteers from business. These technical experts have provided free services to more than 50 percent of New Jersey's 600 school districts. Activities include designing and configuring computer networks, professional development for teachers, and curriculum development. Additionally, Tech Corps volunteers have provided assistance in developing business plans and revenue streams to the state's 21 Educational Technology Training Centers so they might remain as viable entities once state funding ends. Web sites are available for the national organization (techcorps.org) and the New Jersey chapter (www.tcnj.org).

National Alliance of Business

This national business organization is focused on increasing student achievement and improving the competitiveness of the workforce. The organization comprises 5,000 members including Fortune 500 companies, educators, and business-led coalitions. A number of its publications focus on improving mathematics and science achievement in K-12 schools. For further information call (800) 787-2848 or visit the web site (www.nab.com).

National Association of Partners in Education

This 30-year-old organization develops school volunteer, community service, and business partnership programs. The organization is involved in educational reform efforts, sponsors national conferences, and works with other groups that advocate partnerships. Through its 7,500 grassroots member programs, the organization connects children and classroom teachers with corporate, education, volunteer, government, and civic leaders. Visit the web site (www.partnersineducation.org).

New Jersey Association of Partners in Education

This affiliate of the national association described above consists of school districts, institutions of higher education, businesses, and community organizations. The organization houses a database of exemplary partnership programs, publishes a newsletter, supports statewide program awards, and advocates policies that support public/private collaboration to increase resources for partnerships. Visit the web site (www.njapie.org).

PSE&G and NJ BISEC Environmental Education Grant Program

PSE&G, a New Jersey-based electric and gas company, and the New Jersey Business/Industry/Science Education Consortium (NJ BISEC) offer an Environmental Grant Program for teachers. Teachers of grades K-9 who have projects or classroom unit ideas that connect environmental education with the teaching of mathematics, science, computer science and/or technology concepts are eligible to apply. The program is open to educators who teach in PSE&G's electric or gas service areas. For more information, call NJ BISEC at (201) 216-5635 or visit the web site (www.nj-bisec.org).

Partnering Improves Local Education Efforts

The Educators and DuPont Partners in Science program was organized in 1989 through the combined efforts of educators in Salem County, New Jersey, and employees of the DuPont Chambers Works in Deepwater. All 43 Salem County schools K-12, public and private, as well as Salem Community College, participate in the program.

Professional development activities of the partnership include a Summer Teachers' Institute to increase hands-on, inquiry-based science in the classroom, sponsorship of teacher attendance at the convention of the National Science Teachers Association, inservice programs, and a mentor program for teachers. The partnership also sponsors a Science Olympiad and a Fun with Science show for schools.

In addition, the Salem County Hands On Opportunities for Learning Science (SCHOOLS) is a joint program involving 15 school districts and other education groups in Salem County. More than $250,000 in combined funding from DuPont and the districts is used to provide hands-on, inquiry-based instruction in every K-6 classroom in the county. Twenty-one standards-based kits in physical, life, and earth science, recommended by the Leadership and Assistance for Science Education Reform (LASER) and the National Science Foundation, rotate among all the districts in the county and two districts outside the county.

school and outside organizations. Partnerships initiated by classroom teachers could be replicated and shared in other classrooms and schools throughout the district.

Make evaluation an inherent part of the plan.

Periodic formative and summative evaluations are beneficial in identifying problem areas, planning, refining programs, and institutionalizing the partnership (Otterbourg & Adams, 1989).

Maintain a positive attitude.

There will always be doomsayers who complain that partnerships are too labor intensive and will not work. Ignore those who predict failure before a partnership even has an opportunity to get off the ground. Learn from other people's mistakes so that you can avoid making them when developing your own partnership (McDonald, et al., 1990). Keep an open mind regarding diverse views. In the final analysis, a positive mental attitude, hard work, and perseverance will determine a partnership's success.

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For more than 15 years, Aleta You was involved with the development of state, county, and local partnerships among school districts, institutions of higher education, businesses, and community organizations. She formerly served as Executive Director of the New Jersey Association of Partners in Education. Currently, she is the Senior Equity Specialist for the New Jersey Statewide Systemic Initiative (NJ SSI) at Rutgers, The State University of New Jersey. Email aleta@dimacs.rutgers.edu

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Nationa

What do Personal Pan pizzas, Mickey Mouse, Star Wars, and Cherry Garcia ice cream all have in common? Other than being household words, they bring to mind well-known companies that partner to improve education.

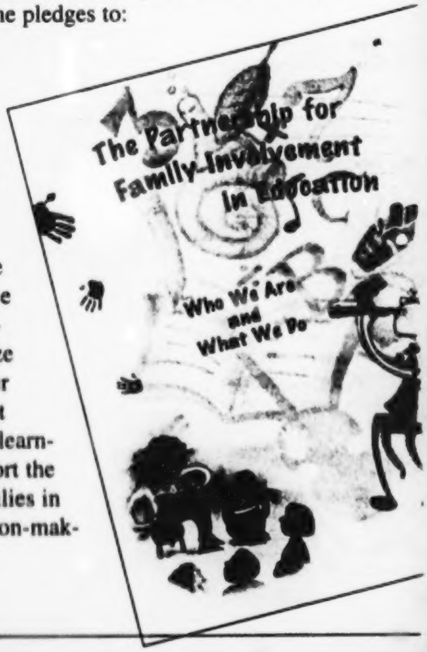
by Annette Thorson, ENC Publishing

A recent national conference on Business and Education partnerships, held in New York City by the Conference Board, brought together scores of leaders from government, business, and educational institutions to share how they have been working with one another to help improve education for all children. Here is just a sample of the ideas and programs discussed and the materials exchanged at that meeting. Perhaps one of these partnerships can be of use to you in your work with students.

Emphasis on Families

The U.S. Department of Education takes the lead by emphasizing the most basic collaboration of all, that between schools and the families of the students they serve. The Partnership for Family Involvement in Education has many components. One is a simple brochure that invites all involved to join the partnership by making the Family-School Partnership Promise. Two-way communication is emphasized, as everyone pledges to:

- Help schools to welcome families; to reach out to families before problems arise; to offer challenging courses; to create safe and drug-free learning environments; to organize tutoring and other opportunities that improve student learning; and to support the inclusion of families in the school decision-making process.



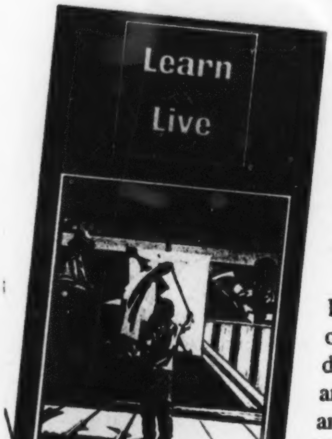
Partnerships that Can Benefit You

- Help families to monitor student attendance, homework completion, and television watching; to take time to talk with and listen to their children; to become acquainted with teachers, administrators, and school staff; to read with younger children and share a good book with a teen; to volunteer in school when possible; and to participate in the school decision-making process.

To learn how to receive the Family-School Partnership Promise Certificate or to discover other initiatives of the Department of Education, call 1-800-USA-LEARN or visit the Partnership web site (pfie.ed.gov).

Starting with Day One

Recognizing the importance of getting parents involved from the very beginning, the First Day Foundation encourages development of First Day of School "Holiday" programs. The Foundation provides a free First Day Holiday Do-It-Yourself Planning Kit to help schools create first-day-of-school events for parents and then enlist the cooperation of employers to give their working parents time off to go to school with their children.



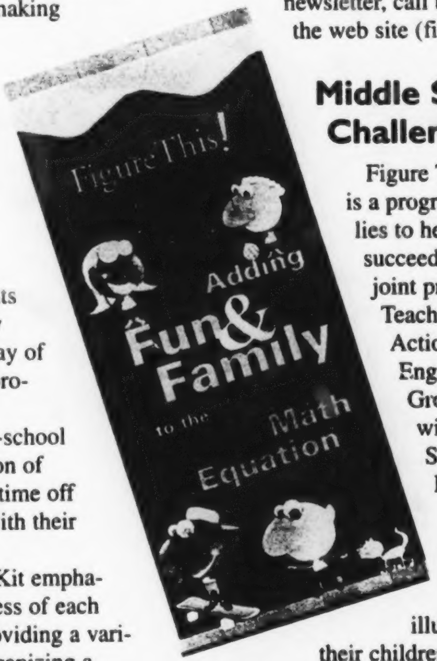
See page 22

The Planning Kit emphasizes the uniqueness of each community by providing a variety of ideas for organizing a First Day Holiday. There is also a free newsletter with planning tips and firsthand accounts of what other schools have done.

An elementary principal in Lafayette, Indiana, reports a turn out of 97 percent of parents of students in first through third grade and 75 percent of parents of fourth and fifth graders. He notes, "Parents appreciate the chance to be in the school with all the students and teachers during the daytime. There's just no way to re-create that atmosphere at an evening open house."

The First Day Holiday is also effective on the secondary level. A middle school principal in Moss Point, Mississippi, comments, "I believe our First Day Celebration helped some of our parents to feel comfortable enough in the school that they were ready to participate in the programs that we offer later in the year."

The First Day Foundation is funded by Hemmings Motor News with contributions from the Ben and Jerry's Foundation, Windham Foundation, and others. For a free copy of the First Day Holiday Planning Kit and the newsletter, call toll free, 1-877-FIRST DAY or visit the web site (firstday.org).



Middle School Math Challenges

Figure This! Math Challenges for Families is a program that provides a fun way for families to help their middle school students succeed in mathematics. The initiative is a joint project of the National Council of Teachers of Mathematics, the National Action Council for Minorities in Engineering, the Widmeyer-Baker Group, and the Learning First Alliance, with the support of the National Science Foundation and the U.S. Department of Education.

The Math Challenges consist of a series of interesting questions (Why aren't manhole covers square?) that get students thinking and illustrate to parents the kind of math their children are doing in middle school. In addition to providing "the answer," each Challenge offers suggestions for investigating the problem and ways to extend thinking.

The Figure This! partnership is extending its reach by encouraging the involvement of local community organizations and businesses. These organizations are encouraged to distribute the Figure This! Challenges to customers, employees, or organization members and to support the initiative in other ways.

To see all of the Challenges and for more information, visit the Figure This! web site (www.figurethis.org), winner of ENC's Digital Dozen Award, or call toll-free, 1-877-GO-SOLVE.

Safe & Smart After School

Safe & Smart: Making the After-School Hours Work for Kids, an 87-page guide produced through a partnership of the U.S. Department of Education and the U.S. Department of Justice, has recently been updated and is available online.

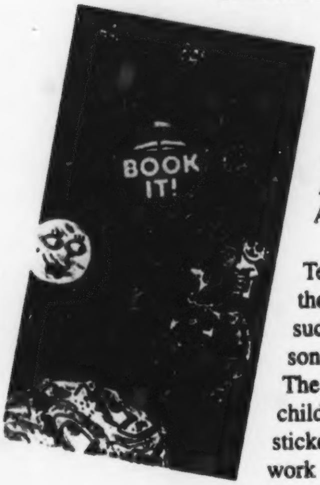
The guide is written for superintendents, principals, teachers, parents, community members, employers, local governments, and faith communities who want to start or expand after-school programs. It looks at recent research, resources, and information on promising efforts.

One of those efforts is an after-school program in Los Angeles where teachers and school staff provide a safe haven for students to develop self-discipline, confidence, and interpersonal skills. Operating in 62 schools, the program serves 10,000 students, many of whom are vulnerable to gangs, crime, and drugs. The program includes homework assistance, learning activities and clubs involving computers, cooking, organized sports, field trips, dance, music, science, and art. Parent and volunteer participation is high. Evaluations show that children in the program get better grades, have greater enthusiasm for school, and show positive changes in behavior.

Visit the web site (www.ed.gov/pubs/parents/SafeSmart) for the complete content of the guide.

Books and Pizza

Space: From Mythology to Technology is the theme of the 2000-2001 Book It! National Reading Incentive Program for Grades K through 6. The program is sponsored by the Pizza Hut Corporation in partnership with the America Reads program of the U.S. Department of Education. Special assistance for the space theme was provided by the National Aeronautics and Space Administration.



Book It! is classroom based. Teachers set monthly reading goals for their students, then award each child's success with a certificate for a free personal-size pizza at their local Pizza Hut. The restaurant manager congratulates the child and presents a Book It! button and sticker as well as the pizza. Children can work to qualify for the All-Star Reader's Honor Roll. No purchase is necessary.

Participating teachers receive a free packet of materials. Principals of schools with 100 percent participation can enter a sweepstakes to win $10,000 to benefit the school. Registration for the program is in June for the following school year, but teachers can visit the program web site (www.bookitprogram.com) at any time for details and to access an annotated bibliography of fiction and nonfiction books chosen by a children's librarian.

Classroom Creativity

The Disney Learning Project and Project Zero of the Harvard Graduate School of Education are collaborating on a series of professional development resources titled Creativity in the Classroom: an Exploration. Each volume of the series includes a video and educator's guide presenting examples of teachers who are using creative approaches to teaching and to supporting students' creativity. (For a more detailed description, see Focus on the Collection, page 59.)

Readers can obtain a free copy of the video and guide by sending a request on school letterhead to:

Creativity in the Classroom
c/o Disney Learning Partnership
500 South Buena Vista Street
Burbank, CA 91521-7766

Or send an email with name, school name and mailing address to Disney.Learning@disney.com Volume 2 of this series is due to be published early in 2001; both volumes are available free while supplies last.

The Disney Learning Project is an outgrowth of Disney's American Teacher Awards, an initiative that has honored teachers for classroom creativity since 1989. In addition to continuing the award program and producing the Creative Classroom series, Disney has developed the Creative Learning Communities grant program for public elementary schools. The Project also supports the Johns Hopkins University's Center on School, Family, and Community Partnerships, which encourages effective parent-teacher communication nationwide.

Visit the project's web site (www.DisneyLearning.org) for more information on nominations for the American Teacher Awards and on all of the Project's activities.

Highlighting School Successes

Examples of community and business partnerships are major components of one of the George Lucas Educational Foundation's (GLEF) primary products the *Learn & Live* kit. Included in the kit are a documentary film hosted by Robin Williams and a 300-page companion resource book. (For a more detailed description, see Focus on the Collection, page 57.)

One successful partnership featured is an effort by the West Des Moines, Iowa, Community School District to provide educational services to all community residents, not just school-age children. Senior citizens are among the most active groups of learners. Says one 72-year-old resident, "People wonder why we don't leave during the winter snow. I tell them, there are too many things going on in this community…too many friends, too many things to learn."

The kit containing the *Live & Learn* video and book is $20 and can be ordered through the Foundation's web site (www.glef.org). The site, which has been honored with ENC's Digital Dozen Award, presents highlights of the kit.

Visit the site for complete information on all the Foundation's activities. Currently under development are a documentary film and companion materials that highlight innovative efforts to prepare teachers and examples of how technology is helping them teach in new ways.

Writers' Guidelines for ENC Focus

Guidelines for Content of Articles

ENC publishes print and electronic materials on specific topics of interest to teachers of K-12 mathematics and science. Articles submitted for consideration should be grounded in the national educational standards while being short (500 to 2,000 words) and compelling. It is essential that articles promote educational equity and advance the principle of "education for all."

We particularly invite teachers to write about their classroom experiences, using first person and a conversational tone. Please note that library research papers written in academic language for graduate school courses are unlikely to be selected for publication. We do, however, encourage you to include a few, carefully chosen references or a brief reading list. All content must be original, and all quotations must be properly cited.

We also publish essays by K-12 students about their successes in mathematics and science. Teachers are encouraged to assist students in writing and submitting materials for publication.

ENC is not interested in publishing articles that have the main goal of promoting commercial products.

Guidelines for Photographs and Illustrations

Photos or other illustrations add interest, and good illustrations increase your chances for publication. Photos should show students involved in an activity rather than looking directly at the camera. Students in laboratory settings must be shown following appropriate safety guidelines and wearing proper safety attire, including eye protection. Please select photos that depict diverse students and teachers working together.

Please note that we can use photos of children under 18 years of age only if we receive written permission signed by a parent or guardian. It is important that the form specify that permission is granted for use of the image on the Internet as well as in print. ENC will provide permission forms on request.

Photos, slides, negatives, drawings, or charts may be mailed to the editor. We prefer color, but black and white photos are also acceptable. Photos should be at least 4x6 inches. Tape an identifying label on the back of each item rather than writing on it. Photos and other illustrations or materials will be returned only on request. Keep in mind that we will not be able to return any material until after the magazine is printed.

If you use a digital camera, please take photos at your camera's highest setting, which may be 1024x768 or 1240x960. You can then attach those photos to an email or send them to us on a disk. Scanned images need to be at least 300 dpi; the dimension of the image should be at least 4x6 inches. Save the images as jpeg files. Digital photos printed on photographic paper with an ink jet printer are not acceptable because the resolution is inadequate for reproduction.

Submission Details

Authors of unsolicited manuscripts are urged to send a brief proposal via email well in advance of the deadline for the upcoming topic. Proposals should explain how the article fits the topic and how it serves the needs of K-12 teachers. Future topics and deadlines are regularly published in both the print and online versions of the magazine.

We prefer that manuscripts be submitted electronically. A Microsoft Word or text file attached to an email message works well. Manuscripts can also be submitted by fax or regular mail. Paper submissions must be typed in a large, clear font; this is especially important for those sent by fax.

Each manuscript must be accompanied by the full names, postal addresses, telephone numbers, and email addresses of all authors. In addition, each author must be further identified with one or two sentences providing the author's professional affiliation and background.

We cannot consider manuscripts that have been submitted elsewhere. Occasionally we reprint outstanding articles that have been previously published. Authors suggesting their own articles for reprint must provide written permission from the original publishers.

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The Editing Process

Your proposal or manuscript will be acknowledged as soon as possible after it is received. Inclusion of your email address greatly speeds this response.

Please keep in mind that just because an article has been acknowledged does not mean it has been accepted for publication. Sometimes we cannot determine whether a particular article will be published until all articles for the issue have been edited.

All articles, solicited and unsolicited, are reviewed by ENC's mathematics and science education experts both before and after they are edited, and edited articles are reviewed by officials at the U.S. Department of Education. At any step in this process, ENC reserves the right to decline to publish any article, to delay publication until a later issue, or to publish an article online and not in the print version of the magazine.

During the editing process, you may be contacted to answer questions about your article. Or you may just receive an edited version of your article for your approval. At this point we need an immediate response, even if the article is correct to print as edited.

Please keep in mind that articles may be changed significantly to suit the needs of our audience, to match our style, or to fit in the space available. We want the edited version to be factually correct and to express your views accurately, but ENC retains the right to make final editing decisions.

When Your Article Is Published

ENC mails five copies of the print version of the magazine to each author. Requests for bulk shipments of the print version will be filled while supplies last.

Upcoming topics and deadlines are listed on page 5.

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Finding Prospective Partners

Reaching out to every sector of your community is a key factor in successful partnership building.

by J. Patrick White Triangle Coalition for Science and Technology Education, Washington, DC

Anyone who looks closely will see that, compared with business, museums, and government, schools are resource-poor in the areas of science and technology. This leads to the obvious conclusion that the outside world can, and should, be a resource for education. And as people begin to think in these terms, it becomes equally clear that one of the best ways to marshal the science, mathematics, and engineering resources available in a community is collaboration.

Identifying underlying purposes of a partnership and potential community participants are the first tasks of alliance or partnership building. But even at this first step, leadership is required; coalitions do not come about spontaneously, no matter how strong the interest or how good the intentions of the prospective participants. Initially a team of five or six individuals is needed to hold a brainstorming session to come up with a list of goals and of all possible organizations and individuals who might have an interest in reaching them.

The Triangle Coalition for Science and Technology Education

The Triangle Coalition is a Washington, DC-based non-profit organization comprised of more than 100 members with representation from business, industry, and labor; scientific and engineering societies; state and local alliances; education organizations; and governmental agencies.

The mission of the Triangle Coalition is to foster collaboration among leaders in education, business, and government to improve science, mathematics, and technology education.

Among the programs that the Coalition administers is the Albert Einstein Distinguished Educator Fellowship Program. This program provides outstanding K-12 mathematics and science teachers the opportunity to serve in the national public policy arena. Selected teachers receive funding to spend a school year in Washington, DC, working on Capitol Hill or with the U.S. Department of Education, the U.S. Department of Energy, NASA, the National Institutes of Health, or the National Science Foundation. Additional information about this program is available on the web site.

Triangle Coalition for Science and Technology Education
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Washington, DC 20005
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Fax (202) 289-1303
Email: tricoal@trianglecoalition.org
www.trianglecoalition.org

Reaching Out to Everyone

All communities are different; look at the human resources available in your particular situation. Remember, you want people to buy into this effort from the beginning so be as inclusive as possible and be sure to touch base with the movers and shakers in your community. Some groups that are often represented in partnerships or alliances include:

From the private sector:

- chambers of commerce
- trade associations
- local businesses and industries, including branches of national corporations
- local chapters of industrial unions

From government:

- research laboratories
- agencies (federal, state, or local) that employ technical personnel in science, mathematics, or technology
- state and local legislators (city council members, for example)
- representatives of the political power structure, from the mayor's office, city council, and political parties

From education:

- state and local school boards
- state and local public and private school administrators including superintendents, principals of elementary and secondary schools, school system curriculum specialists, teachers, and counselors
- representatives of local teachers and teacher unions
- representatives of professional discipline organizations such as the National Science Teachers Association, the National Council of Teachers of Mathematics and the International Technology Education Association
- representatives of science and technology museums
- science, mathematics, engineering, and education faculty, researchers, and administrators of colleges and universities
- parent organizations

From the science and technology community:

- chapters of national scientific and engineering societies such as the American Chemical Society, American

Physical Society, American Medical Association, Sigma Xi, American Society of Mechanical Engineers, and Institute of Electrical and Electronic Engineers

Others:

- religious and social organizations
- local sections of organizations of retired persons such as the American Association of Retired Persons or the Retired Teachers Association
- service organizations such as Kiwanis and Lions
- community groups such as 4-H, Scouts, and environmental groups
- individual parents
- media (radio, TV, print), public relations companies or consultants, corporate public relations offices

Once you have truly considered all possibilities in your community, it is time to draw up a "best prospects" list. This list should be short enough that personal contact can be made with someone in each organization. Recruitment letters are usually less persuasive than telephone or face-to-face contacts. Your purposes are much too complex to be explained in a one-page letter, which is the most people can be expected to read. Active discussion of the purpose of the alliance and the potential benefits to individual members and the community is the best way to secure the commitment of individuals and their organizations.

Support from top levels of authority in companies, the school system, and universities is essential; but the people who will put your alliance into operation will come from all levels of practice and management and should be part of your planning from the beginning.

From Planning to Doing

It is now time to bring people together to consider the original goals and to achieve consensus on what specifically needs to be done in mathematics, science, and technology education, and what your particular alliance will be able to do. During the formation of a new alliance, the philosophy, mission, goals and objectives, action plans, communications, funding, and evaluation will be constructed almost simultaneously with the consensus building.

Once an alliance has identified the issues it wants to address, it must then initiate activities. As a first step, you may want to look at case studies of projects that have been in operation around the country for some years. The Triangle Coalition for Science and Technology Education has made a point of collecting information about existing alliances and provides direct links to many successful alliances on its web site (www.trianglecoalition.org). Two of these are described in this issue of *ENC Focus*: see the article about SWEPTs (page 27) and the article about the Center for Science, Mathematics, and Technology Education (see below).

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The Center for Science, Mathematics, and Technology Education

The Triangle Coalition identifies organizations that build partnerships. Here's an example of one of the most successful.

by Ed Geary and Christine Jones, Colorado State University, Fort Collins, Colorado

The Center for Science, Mathematics and Technology Education (CSMATE) is sponsored jointly by the Colleges of Natural Sciences and Applied Human Sciences at Colorado State University. Its primary goal is to reach out to the community to foster innovation in science, mathematics, and technology instruction at all levels, K-16. Beginning in 1991, CSMATE has forged partnerships with local school districts, the business sector, and other universities and colleges to fulfill its mission. These efforts have resulted in a number of exciting programs.

One of the cornerstones of CSMATE's success is Small-Scale Science, which was first developed by Stephen Thompson more than two decades ago. Originally created to change the nature of teaching and learning in Thompson's college chemistry courses, Small-Scale Science has proved to be such a success that it has spread to thousands of secondary and college science classrooms across the country. The program is based on creativity, invention, problem solving, and authentic assessment. Experiments are designed to be inquiry-based and hands-on while being time efficient, inexpensive, and conserving of natural resources.

The Little Shop of Physics (littleshop.physics.colostate.edu), a program created by Brian Jones of the Colorado State

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The ideas in these and other articles in this issue and on the Triangle Coalition web site are far from inclusive; the special circumstances of your community will suggest other options as well. Bear in mind that to make things happen, the alliance must include all interested parties, from the corporate CEO to classroom teachers, as active partners in decision making and project implementation. Otherwise, quite simply, nothing is going to work. But whatever route your group proposes to go, remember that alliances are the glue that holds the effort to improve, reform, and enhance education together and gives it strength.

J. Patrick White has taught both mathematics and science at the secondary level. He received the Presidential Award for Excellence in Mathematics Teaching and was twice selected as an Albert Einstein Fellow. Prior to taking his current position as the Executive Director of the Triangle Coalition, he was the Mathematics and Science Coordinator for the Idaho Department of Education. Email him at whitep@triangle-coalition.org

physics department, was recently featured in *People* magazine (May, 2000). The K-12 program promotes dynamic, hands-on student learning about forces and motions.

CSMATE is involved in several other successful partnerships. The Rocky Mountain Teacher Education Collaborative is a multi-institutional, systemic reform effort to improve the preparation of science and mathematics teachers. The Colorado Integrated Mathematics Initiative is a partnership with the Gates Corporation and Poudre School District to promote standards-based teaching and learning of algebra, geometry, and data analysis. The International Telementoring Center is a partnership with Hewlett Packard to nurture student interest in science and technology through online mentorships with practicing scientists and engineers.

Some of these programs are developed primarily by our partners and supported by CSMATE, while other programs are developed by CSMATE staff and faculty and supported by our partners. The point is, all of us benefit by this arrangement. Universities, school districts, businesses, and government agencies all working together can lead to significant and sustainable changes. However, such changes require the commitment of all partners and the equitable sharing of responsibilities, work, and rewards. For more information about all of our programs, visit our web site (www.csmate.colostate.edu).

Edward Geary is currently Director of the Center for Science, Mathematics, and Technology Education and a professor in the Earth Resources Department at Colorado State University. Email: egeary@csmate.colostate.edu

Christine Jones, Assistant Director of CSMATE and Assistant Professor of Education at Colorado State University, has directed many of CSMATE's teacher enhancement and professional development programs.
Email: cjones@csmate.colostate.edu

Reaching Out to Different Sectors

The articles in this issue illustrate ways contributors have formed partnerships with various sectors of their communities. Readers interested in working with particular types of organizations can use the list below to locate pertinent information. Please note that some articles mention more than one type of collaboration; the list reflects the primary focus of the article.

Corporations

- The School-Business Partnership: What Can It Offer? (p. 14)
- Reflections on Partnerships from a Special Education Teacher (p. 15)
- SWEPTs Bring Sweeping Changes (p. 27)
- How a School Partnership Broadened My Horizons (p. 35)
- Thirty Years and Counting (p. 37)
- Science Summer Camp for Teachers (p. 46)

Government and Nonprofit Organizations

- National Partnerships that Can Benefit You (p. 20)
- The San Diego Science Alliance: High Tech Meets High Interest (p. 34)
- Coalitions Advance Educational Equity for Girls (p. 30)
- Partnership for Lifelong Learning (p. 45)

Local Businesses

- Seeking Ways to Improve Math Achievement? Try the Mall! (p. 32)
- From Flowers to Computers (p. 39)
- Projects that Work (p. 36)

Universities

- The Center for Science, Mathematics, and Technology Education (p. 25)
- Teens Take a Healthy Interest in their Communities (p. 40)
- Local Support Provides Student Challenges (p. 43)

SWEPTs Bring Sweeping Changes

Professional development comes from the real world of business for teachers who participate in SWEPTs (Scientific Work Experience Programs for Teachers).

by Barbara Rodrigues, Industry Initiatives for Science and Math Education, Santa Clara, California

Julie Bitnoff, California High School, San Ramon, California

I-Heng McComb, Monta Vista High School, Cupertino, California

Looking for professional development that:

- links business and educators?
- increases respect for teachers within the business community?
- provides cutting-edge, practical, scientific and technical experience to teachers?
- successfully helps teachers transfer their learning to the classroom?
- supplements teachers' salaries?

What you are looking for is a SWEPT—a Scientific Work Experience Program for Teachers.

Currently in operation in several states (see page 29), SWEPTs provide K-14 teachers with paid four- to eight-week summer fellowships in industry, university, or government research labs. These fellowships are different from most "Educator in the Workplace" internships, which are typically one- or two-week experiences. In a SWEPT fellowship, teachers complete a technical or research project of benefit to their sponsor; they are participants in the sponsor's mission rather than merely observers. Most important, participants develop a plan to transfer what they learn to their students.

In this article, high school biology teachers Julie Bitnoff and I-Heng McComb share their SWEPT experiences. Both were placed in industry fellowships by Industry Initiatives for Science and Math Education (IISME), a 16-year-old nonprofit organization that serves educators and industry in the greater San Francisco Bay Area. (See page 28 for more information.)

Julie Bitnoff:

We science teachers all teach a unit on the scientific method—about how scientists ask questions, formulate hypotheses, and then test those hypotheses with controlled experiments. But how many of us actually get to practice what we preach? I did, as an IISME summer fellow with Roche Molecular Systems in Pleasanton, California.

I would've been happy just mixing reagents or loading the thermal cycler—anything to support the research and development team of Roche's Diagnostics division. I was thrilled to be trusted with the task of conducting some basic investigations into the stability of the AIDS virus—something that apparently had never been done.

Under the guidance of Roche scientists Erich Kyger and Ralf Schoenbrunner, I designed and conducted laboratory experiments that revealed the conditions of pH, temperature, and concentrations of various enzymes, detergents, reducing agents, and chaotropes under which the HIV envelope is stable. These basic characteristics of the virus must be known in order to develop an automated system of sample preparation and detection of the virus in a patient's blood.

I learned new lab skills, and was reminded of the importance of the old ones—observation skills, timing, careful measuring, organization of equipment and space, sterile technique, safety precautions, and mental concentration. But I learned so much more than laboratory skills, and that's what I was most anxious to share with my students.

After every experiment is run, the data are collected and analyzed on an Excel spreadsheet. I created graphs suitable for presentation and wrote a final lab report. I had to learn new computer skills, I had to write concisely, and I had to communicate my findings orally to other scientists and project directors in monthly technical review meetings.

If an experiment's results weren't what I expected, I had to analyze how each step might have been changed, and redesign the experiment. I did background research on my topic, and on the related work of others. If a particular line of experimental research wasn't panning out, it was abandoned for other, more promising directions. After all, Roche Molecular Systems is a business—with product deadlines, revenue and profit concerns, market and customer needs, and competitors.

I returned to school in September with renewed enthusiasm for teaching. To integrate and transfer my workplace experiences into my biology classroom, I developed a "real life application" for my students—DNA Based Screening for Pathogenic Bacteria in Food Samples. Student teams researched and learned about bacterial contamination of food, then tested food samples for the presence of Salmonella bacteria using DNA amplification by polymerase chain reaction and DNA detection by gel electrophoresis. Finally, the team created a fictitious food testing company and drafted a letter to their customer, the food manufacturer, explaining the results of the screening test. I hope this project better prepared my students to be productive and competitive members of the workforce, no matter what field they enter.

I-Heng McComb:

What shouldn't have surprised me, but nevertheless did, was that every product actually worked. I set 82 Advanced Placement biology students loose for five weeks on product-development teams, and I got:

- Gumbi-Gone, a nontoxic, nonflammable chewing gum removal system.
- Sanitaire Creme, a nongreasy antibacterial hand cream that kills bacteria on skin and then continues to protect against future bacterial contact.
- Yeast-O-Meter, a complete kit and protocol for determining yeast culture activity.
- AquaMist, an ultra-strong hair gel that sets without flaking and washes out with ease.
- ClariTest, a miniature starch and vitamin C test kit.
- Respo-Quicko, an educational game that teaches about cellular respiration.
- Forever Beef, a sprayable preservative to keep ground meat looking and smelling fresh.
- Fade-B-Gone, a sunscreen for clothes that retards fading and also blocks UV light from your skin.
- Neo-Grow, a plant growth supplement. (Sorry, the active ingredient is a secret!)

Each product was presented on schedule, complete with packaging, marketing plan, and project history file. I even had help with the grading—each of the ten project managers wrote performance evaluations for all of her/his team members, detailing contributions to the project, strengths, and areas for improvement. All that was left for me to do was blink in amazement.

This classroom project was linked to my IISME Summer Fellowship at PE Biosystems in Foster City, California, during which I participated in the development of a new biotech product. I was engaged in real R&D work—designing reagents, placing orders, keeping records, processing and testing what was received, and sending it out to collaborators for further testing. From the start, I was included in meetings at various levels, from informal exchanges to team meetings to major events like Start Development Checkpoint.

Meanwhile, I was involved in a leadership-training strand at IISME, where I learned project management, problem solving, and a variety of other skills. It all came together when I assigned my students their end-of-year biology project. I designed the teams based on what I had seen at PE Biosystems. The project history file format was adapted from actual paperwork specifications from the company. The sample Start Development Checkpoint document I showed students was a real one.

Less concrete, but equally significant, my own confidence in making the assignment was derived in large part from seeing the power of teamwork in industry, learning how such work is managed, and experiencing the motivation of trying to make a real product work.

Barbara Rodrigues, IISME Education Director, taught for 30 years in California and Michigan. Email: brodrigues@iisme.ucsc.edu
Julie Bitnoff teaches biology at California High School, in San Ramon, California. She has 20 years teaching experience.
I-Heng McComb teaches mathematics and biology at Monta Vista High School in Cupertino, California.

Industry Initiatives for Science and Math Education

IISME was founded in 1985 by a consortium of San Francisco Bay Area companies in partnership with the Lawrence Hall of Science at the University of California, Berkeley.

Since 1985:

- **1,330 Summer Fellowships have been awarded to 760 individual teachers.**
- **27 percent of high school teachers in the San Francisco Bay Area have held Summer Fellowships.**
- **Teachers who have held IISME Summer Fellowships have reached more than one million students.**
- **IISME has placed teachers from 75 public school districts, 220 public schools, and 46 private schools in our service area. This includes 100 percent of all high school districts.**
- **170 companies, foundations, universities and government agencies have contributed more than $11 million of in-kind and direct funding to IISME.**
- **Approximately 950 engineers, scientists, and managers have served as mentors to teachers.**

IISME also coordinates one-day professional development field trips for educators through its Future Connections program. These field trips are hosted by companies in the Silicon Valley and the greater San Francisco Bay Area.

Sample Job Descriptions from the IISME Summer Fellowship Program

Company	Job Description
Applied Materials	Replace worldwide network, secure implementation of new world class security, design and implement evaluation process and report on remote access pilot program.
Canon Research Center America	Perform chemical syntheses on various compounds for use in novel display materials; perform characterization on the synthesized materials for purity, optical efficiency; monitor safety procedures in the lab.
Compac Computer	Evaluate and develop recommendation and processes to offer existing training programs to local educators; design curriculum for new Compaq Customer and Internet Competency Centers.
IBM	Upgrade Product Environmental Profiles to the Corporate PEP database; field inspections for the Environmental Programs department all over plant site; help with Process-EIAs; verify that chemical hazard profiles match the chemicals found in departments around plant site.
Intel	Drive efforts to develop and institute new team member integration and training development plans.
Lockheed Data Systems	Improve and formalize current reference training manuals and data.
NASA-Ames	Develop a hands-on, interactive science and technology education experience for high school students and expand the program using the Internet.
SBC/ Pacific Bell	Work as a part of a team to analyze and track financial results associated with SW-PB, SNET and Ameritech mergers.
PE Biosystems	Develop primer and TaqMan probe sequences and optimize TaqMan tests for relative quantification of gene expressions.
Silicon Graphics	Develop a mini curriculum for K-12 students visiting SGI.
SyStemix, A Novartis Company	Establish and refine rapid quantitative in-process assays to support production and purification of viral vectors.
University of California, Santa Cruz	Investigate parameters that might improve polymer-based photovoltaic cell performance.

SWEPTs Around the Country

Teachers who would like to participate in an existing SWEPT program in the states listed below should contact the individual programs. For assistance in starting a SWEPT, visit the Triangle Coalition web site (www.trianglecoalition.org/swept/swsumm.htm). For more information on that organization, see the article on page 24.

Arkansas STRIVE
Jim Winter
Graduate Institute of Technology
University of Arkansas
2801 South University Avenue
Little Rock, AR 72204
(501)569-8069 / Fax: 501/569-8039
Email: jdwinter@ualr.edu

California: Industry Initiatives for Science and Math Education (IISME)
Barbara Rodrigues
c/o Deskin Research Group
2270 Agnew Road
Santa Clara, CA 95054
(408) 496-5343 / Fax: (408) 496-5333
Email: brodrigues@iisme.ucsc.edu
Web site: iisme.ucsc.edu

Georgia Industrial Fellowships for Teachers (GIFT)
James Rayford
Georgia Institute of Technology
CEISMC
Atlanta, GA 30332-0282
(408) 894-7530 / Fax: (408) 894-9675
Email: james.rayford@ceismic.gatech.edu

Idaho Education Alliance for Solutions (IDEAS)
Julene Messick
Idaho National Engineering Laboratory and Environment
P.O. Box 1625 MS 3810
2525 Freemont Avenue, MS 3810
Idaho Falls, ID 83415-3810
(208) 526-0318 / Fax: 208/526-1880
Email: mej@inel.gov
Web site: www.inel.gov

New York: Summer Research Program for Secondary School Science Teachers
Jay Dubner
Columbia University College of Physicians and Surgeons
P&S 11-511
630 W. 168th Street
New York, NY 10032
(212) 305-6899 / Fax: (212) 305-5775
Email: jd109@columbia.edu
Web site: cpmcnet.columbia.edu/dept/physio/Welcome.html

Oregon: IISME/Educator Excellence Program
Tamra Busch-Johnsen
Business-Education Compact of Washington County
3800 SW Cedar Hills Blvd.
Beaverton, OR 97005
(503)646-0242 / Fax: (503)644-9968
tbuschjo@bec.pdx.org

Washington: Science Education Partnership
Nancy Hutchison
Fred Hutchinson Cancer Research Center
1100 Fairview Ave. North, MS DE-390
P.O. Box 19024
Seattle, WA 98109-1024
(206) 667-4486 / Fax: (206) 667-3548
Email: nhutchi@fred.fhcrc.org
Web site: www.fhcrc.org/education/sep

All of the programs listed above are participating in a National Science Foundation funded study on the impact of SWEPT programs on student learning.

Coalitions Advance Educational Equity for Girls

From Macon, Georgia, to Madison, Wisconsin, AAUW Educational Foundation grants help fund successful educational partnerships.

by Denice Aldrich Jobe, AAUW Educational Foundation, Washington, DC

Recognizing that partnerships can extend the benefits of community-based projects, the American Association of University Women (AAUW) Educational Foundation encourages coalition building through one- and two-year Community Action Grants. Two-year grants support a year of planning and a year of implementation for partnerships designed to advance K-12 girls' achievement in mathematics, science, and/or technology. One-year grants are available for other projects that promote education and equity for women and girls.

The grant recipients described in this article demonstrate how teachers, administrators, university researchers, local groups, and even students can work together to make a difference in their communities.

Mercer MESSAGE

With help from a two-year, $10,000 Community Action Grant, Linda Hensel, a molecular geneticist in the biology department of Mercer University, and her colleague Hope McIlwain, of the mathematics department, developed a summer camp called Mercer MESSAGE (Math, Engineering, and Science, Summer All Girl Experience). The program was developed for fifth- and sixth-grade girls of color in a Macon, Georgia, neighborhood.

The camp introduces the girls to mentors who are studying science or mathematics in college and provides an opportunity for them to meet professional women working in these fields. Campers also participate in a science fair and learn how to use equipment including high-powered microscopes, microbiological culturing media and chambers, and molecular tools, such as those used for DNA fingerprinting.

Hensel and McIlwain needed local support to get the camp started. Mercer University offered campers full use of campus laboratory and computer equipment. The Mercer Center for Community Development (MCCD), an organization established by the university to work with local groups to revitalize the neighborhood, offered its strong connections in the community to drum up local interest. The organization also contributed more than $3,000 to help cover science fair expenses and other activities.

Another important connection was the Bibb County Public School superintendent, who put the organizers in contact with school principals and teachers. Teachers' involvement was critical in helping to develop the camp curriculum, select campers, screen mentors, and set up meetings with parents.

Once she and McIlwain established ties in the schools, they had little trouble gaining support in the community. "We easily sold our program to everyone we talked to…because we were bringing math and science and technology to children."

For teachers interested in working with university partners, Hensel offers this advice: "Find people in the university who care and already are involved in the community and invite them into your classroom so they can interact with students and see first-hand what the children want and need."

Hensel and McIlwain found that their partnership with the county schools and the community was essential to the success and sustainability of their project. Their efforts have paid off for the community. Since receiving an AAUW Educational Foundation Community Action Grant, they have been awarded a $100,000 grant from the American Honda Foundation to continue the project. This funding will support for up to two years the summer camp for girls and a similar coed camp, Mercer TECH.

Lilith Computer Clubs

In 1997, Susannah Camic, then a high school student in Madison, Wisconsin, wrote a research paper calling for girl-oriented software and computer organizations. "In middle and high school," she wrote, "I have often been the one girl in a computer lab with 30 to 40 boys." Her research—followed up with persistent partnership building among area organizations and institutions—led to the formation of Lilith Computer Clubs.

Networking was key to getting the idea off the ground. Camic's teacher contacted Karen Dettinger, then a doctoral student in industrial engineering at the University of Wisconsin, Madison. Dettinger was enthusiastic, since Camic's findings confirmed her own research, which had found alarming disparities in girls' and boys' enrollments in advanced science and computer classes. Also involved was Kathy Price, community partnership coordinator for the Madison Metropolitan School District, who notes, "Susannah's struggles were personally significant to these women engineers because they had experienced similar barriers to success in their field. They didn't want to see another generation of girls go through the same thing."

Price encouraged Camic to apply for a grant from the local Dane County Youth Commission. The commission responded with a $3,000 grant to cover refreshments and club leader honoraria. The first three Lilith Computer Clubs were launched in the fall of 1997, followed by a fourth in the spring of 1998. Also in 1998, the first computer fair for girls was held with the help of the University of Wisconsin, College of Engineering, which donated computer software, supplies and equipment, lunches, bus transportation, and computer lab facilities.

The AAUW Educational Foundation awarded the clubs a $5,000 one-year Community Action Grant to take the project one step further and develop the *Lilith Computer Club Guidebook*. The publication helps sustain and expand the program by making it easy for volunteers to start new clubs. Dettinger enlisted women from the University of Wisconsin, the school district, and the community to write the guide. She used part of the grant to hire a team of university researchers to evaluate the publication's effectiveness and the program's overall impact on girls.

Organizers parlayed the highly positive results of that evaluation to win an additional $50,000 in funding from the Madison Community Foundation. The grant allowed them to launch four more clubs and hire a part-time project coordinator who will meet quarterly with an advisory network of university partners, community organizations, advocacy groups, and business leaders. Price anticipates that these relationships will result in increased mentoring opportunities for the girls, new resources for the clubs and fairs, and additional funding to keep the project going indefinitely.

It Can Happen in Your Community

Mercer MESSAGE and the Lilith Computer Clubs demonstrate that when the community is supportive and involved, projects can grow in ways that otherwise would be impossible.

To help community organizers establish and maintain effective collaborative grassroots programs, the AAUW Educational Foundation developed the *Community Coalitions Manual*. This comprehensive guide leads organizers though project planning, coalition building and community organizing, as well as volunteer recruitment, evaluation, fundraising, and media relations. An extensive list of web resources and contact information for more than 200 national and grassroots organizations is provided. Also highlighted are lessons learned from the Girls Can! Community Coalitions Project, a nationwide gender equity program conducted from 1994 through 1997.

For more information about the *Community Coalitions Manual* visit AAUW's web site at www.aauw.org, or call (800) 225-9998. To apply for an AAUW Educational Foundation Community Action Grant, call (319) 337-1716, or visit www.aauw.org and click on Fellowships, Grants, and Awards. The postmark deadline for 2001-2002 Community Action Grant applications is February 1, 2001.

Denice Aldrich Jobe is the Program Associate for K-12 and Community Programs at the AAUW Educational Foundation, Washington, DC.

Lilith Fair
2000

Seeking Ways to Improve Math Achievement? Try the Mall!

Math in the Mall, a tutoring program for middle and high school students, is a successful way to use community resources to reach beyond school walls.

by Judi Wilson and Veray Wickham, San Joaquin County, California, Office of Education

Among the evening shoppers at the Sherwood Mall in Stockton, California, it's not unusual to see a number of teenagers with books under their arms and pencils behind their ears. These teenage shoppers are not looking for the latest fashion craze nor expecting to socialize with friends. They need help with their math homework, and they know where to find it.

During the first two years of its existence, more than 400 students from public and private schools have taken advantage of the expertise of volunteer math tutors through our Math in the Mall program. With new academic standards for mathematics demanding a heavy dose of algebra and a high school exit exam looming, some teenagers in California schools are looking for extra support.

Resources for the students in the Stockton area are limited; many parents cannot afford to pay for tutoring and do not know where to get help for their children. Offering tutors in the shopping center seemed to be a timely, convenient, and accessible program for young people. But skeptics warned, "You'll never get kids to go the mall for math help!"

Students Line Up

Clearly, the skeptics were wrong. From five to seven o'clock, Monday through Thursday evenings, two volunteers are available at the mall to tutor middle and high school students, and occasionally elementary students. Sometimes the tutors find a line of students waiting for them.

Students learn about the service through newspaper notices and flyers sent to the schools. The atmosphere in the tutoring space is purposely businesslike. Rules for behavior are posted and enforced. Students are expected to bring paper, pencils, and textbook or homework assignment. Bringing friends or food to the sessions is not allowed. There is no limit on the number of times students can use the service so long as each visit is productive and they comply with the rules. Many youngsters return numerous times, and several students can point to dramatic improvements in their grades.

Math in the Mall is housed in a storefront occupied by the Stockton Satellite City Hall, which offers a number of city government services to shoppers—from Internet access to sale of fishing licenses. The Sherwood Mall, the Satellite City Hall, and the San Joaquin County Office of Education have partnered to provide the math tutoring service at this location.

In addition to helping set up the tutoring area, Sherwood Mall publicizes the program on its web site, and provides a phone line for the Internet connection. The county education office schedules the tutors and keeps a list of substitutes. The staff at the city hall gives each tutor a reminder call prior to his or her scheduled session.

Tips for Successful Tutoring Programs at the Mall— or Other Off-campus Sites

- Find a site that is open and staffed during after-school hours. This eliminates the need for keys and locking up procedures.
- Solicit a volunteer to be the phone contact for the tutors. This can be done at the site or from the volunteer's home. Reminder calls improve volunteer attendance.
- Provide training to the tutors in face-to-face meetings or newsletters (online or mail).
- Collect evaluation comments from students and tutors after each session. Keep and review these comments to improve the program and spot potential problems.
- Post procedures and clear rules of behavior at the site so students and tutors know what to expect. Include rules for computer and Internet use as well.
- Request that tutors make a yearlong commitment to the program and assign them to work in pairs for backup and mutual support.
- Give tutors choices about how much time they can commit. (We have found that two hours per week is less popular; most of our tutors give two hours every other week or four hours per month). Avoid tutoring during school vacations, holidays, and weekends.
- Recognize volunteers. Provide tutors with items that help them identify with the program (t-shirts or other items with logo) or provide public or personal recognition.

Tutors Bring Diverse Perspectives

Among our current volunteers are five active or retired high school math teachers, four members of the faculties of a community college and a private university, one retired county employee, two elementary teachers, two government employees from the planning and engineering departments, and one aerospace engineer. Volunteers always tutor in pairs so that they can help one another and seek each other's assistance should there be any problems. These math enthusiasts from different occupations enjoy meeting others with a common interest.

Although all tutors are very able in mathematics, they are not necessarily equipped to teach a variety of age groups with diverse math needs. A monthly newsletter gives tips on tutoring skills and responds to tutors' comments. Topics covered include the math curriculum in the local schools, effective questioning techniques, typical homework assignments, and the types of errors students frequently make.

When tutors are not busy with students, they answer email from youngsters who cannot make it to the mall or who live out of the area. Tutors have a list of Internet sites where students can practice their skills while they are waiting for their tutor or their ride home.

Tutors volunteer to work every other week for two hours. They are asked to make a one-year commitment to the program and donate a total of 36 hours from September through May. Prospective tutors complete an application form and are interviewed. Screening procedures include a test for tuberculosis and fingerprinting for a background check. No tutor is permitted to participate in the program without the completion of screening procedures.

Everyone Wins

Mike Donaghy, manager of Sherwood Mall, sees this program as a win-win situation for all involved, noting that the students receive help with their schoolwork, the mall benefits from the positive public relations, and the merchants are pleased with the number of parents who shop while their students are visiting the tutors.

It is also important that tutors feel like winners. Because they have busy schedules in addition to their tutoring, finding convenient times for recognition events was difficult. Instead, we have found that gifts and public recognition are better ways of saying thanks. During the week of Thanksgiving, the mall's digital signboard reads, "Thank You Math in the Mall Tutors!" At Christmas time, tutors receive a basket of goodies when they arrive for their tutoring duty. Items such as t-shirts, sweatshirts and carryalls with the Math in the Mall logo have been well received.

Math in the Mall turns upside down the common stereotype of adolescents just hanging out at the mall. In our community, teenagers use the mall as a destination for mathematics achievement. For them, the mall and mathematics tutoring are definitely a winning equation!

Internet Resources Used by Math in the Mall

Ask Dr. Math (mathforum.com/dr.math/office_help)

Mathematical Games, Toys, and Puzzles (compgeom.cs.uiuc.edu/~jeffe/mathgames.html)

Interactive Mathematics Program homepage (www.mathimp.org)

Mega.Math (www.c3.lanl.gov/mega-math)

California State Board of Education: STAR data, GSE information, and more. (www.cde.ca.gov/cilbranch)

Mathematics Education Resources Online (www.cmc-math.org/resources.html)

Mr. Titen's Math Page (www.geocities.com/EnchantedForest/Tower/1133)

Suggested Readings

Stallings, B. (1992). *Resource Kit for Managers of Volunteers*. Pleasanton, CA: Building Better Skills.

Zaslavsky, C. (1996). *Fear of Math: How to Get Over It and Get On with Your Life*. New Brunswick, NJ: Rutgers University Press.

Judi Wilson is the director of math and science at the San Joaquin County Office of Education in Stockton, California. In addition to being involved in implementing standards in the classroom, she is interested in forming community partnerships to support the standards. Email jwilson@sjcoe.net

Veray Wickham is the community involvement coordinator for San Joaquin County Office of Education. She matches and trains volunteers for education programs and seeks community resources to improve education.

JUMP ONLINE!

Keep up with the fast-breaking news about schools across the nation by visiting ENC Online (enc.org) and clicking on "News." There you'll find news articles of special interest to math and science teachers culled from some 50 newspapers every weekday. Read them and share them with your colleagues.

The San Diego Science Alliance:

In a region rich with science and research institutions, science education benefits.

by Nancy Taylor, San Diego County , California, Office of Education
and Joy Wochenske, WestEd Regional Consortium

In San Diego, where high technology businesses and research institutions have been eager to participate in K-12 science education programs, an organization like the San Diego Science Alliance (SDSA) was a natural outgrowth. Currently, SDSA consists of more than 200 technology-related businesses, research institutions, colleges and universities, professional education organizations, and other groups committed to fostering science literacy in the county.

One of the first efforts of the SDSA was to identify local science-related programs and resources. In 1994 the first resource catalog was printed and disseminated to local educators. Long before it was commonplace for a small nonprofit organization to have a web site, the SDSA, partnering with the WestEd Eisenhower Regional Consortium, created a searchable database of hundreds of organizations and the programs they offer for science-related education (www.sdsa.org). Since the web site was created, several foundations and companies have provided resources to assist the SDSA in developing interactive online tools, including the Ask-A-Scientist program and discussion groups.

A few examples of the partnerships between this alliance and the schools illustrate the opportunities for teachers and students:

High Tech Fair

Now in its third year, this event for high school science and mathematics students draws more than 60 local businesses and research facilities and more than 1,700 students from 40 high schools. The exhibitors, representing biotechnology, engineering, transportation, and communication industries, agree to provide exhibits that demonstrate real applications of science. Area businesses volunteer their time to develop a public relations plan, write press releases, and manage media relations for the event. The San Diego County Office of Education develops pre-trip activities for teachers and students. Visit the web site (www.sdsa.org/hightech).

PISCES Project

PISCES (Partnerships Involving the Scientific Community in Elementary Schools) brings scientists into classrooms as visitors and as partners for science instruction. Grants from the Hewlett Packard Foundation, a local family foundation, and the San Diego Science Alliance Board supported the pilot phase of the project. PISCES is now funded by a grant from the National Science Foundation. University graduate students partner with K-6 teachers for kit-based science instruction. The web site (www.sdsa.org/pisces) provides more information.

BE WiSE

The Better Education for Women in Science and Engineering program was launched in 1998 by a group of 16 women who wanted to encourage school-age girls to pursue careers in science, math and engineering. Chapters of Graduate Women in Science, Society of Women Engineers, National Society of Black Engineers, and the Association of Women in Science worked with the San Diego County Office

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How a School Partnership Broadened My Horizons

A physicist recounts how his introduction to the world of science education reform and inquiry-based instruction enriches his life and work.

by Lawrence Woolf, General Atomics,
San Diego, California

The General Atomics Sciences Education Foundation (GASEF) was established in 1995, but it really started in 1992 with a volunteer partnership between scientists at General Atomics, a research and development company, and science teachers in the San Diego area. The partnership's initial purpose was to engage scientists and teachers in producing educational modules that would fuse the content and methods of industrial research with the teaching skills of experienced science teachers.

Four teams of scientists from General Atomics, middle school science teachers, and high school science teachers were formed to jointly develop four modules, which focused on materials science, fusion, recombinant DNA, and the atom. I was one of the four scientists who contributed to writing the Exploration of Materials Science module.

HighTech Meets High Interest

of Education to find financial assistance from local businesses and foundations. Among the activities of the program have been overnight adventures in science for 30 to 40 seventh- and eighth-grade girls. The girls are chosen on the basis of essays they write. Each girl is given a science book on the subject of the night's adventure. A second copy of the book is given to the girl's school library as a donation from that girl. Visit the web site (www.sdsa.org/bewise).

Science Interconnections

This program allows teachers to interact with scientists and researchers at institutions such as the Salk Institute for Biological Studies, General Atomics (see the accompanying article), Science Applications International Corporation (SAIC), and the University of California, San Diego, Animal Research. Teachers enroll in a series of after-school seminars at the facilities.

Nancy Taylor is the K-12 science coordinator at the San Diego County Office of Education, a board member of the San Diego Science Alliance, and director of the PISCES Project.

Joy Wochenske, a consultant with WestEd Regional Consortium, works with the San Diego Science Alliance on special events and web site development.

This effort catalyzed my development of a related module titled "The Line of Resistance: Using a Graphite Pencil to Explore the Electrical Properties of Materials and Circuits," based on the idea of using a pencil to draw circuits and measure their properties. At about the same time, I attended the American Physical Society's five-day Teacher-Scientist alliance workshop where I learned about issues in K-6 science education reform. Based on this new knowledge, I revised this module so that it specifically addressed national standards and was inquiry-based.

Another module was based on my belief that students would learn much by taking apart complex household objects, just as they learn from the dissection of animals. In particular, I felt that students would enjoy dissecting a light bulb, an object they use every day without knowing how it works. The resulting module, "Seeing the Light: The Physics and Materials Science of the Incandescent Light Bulb," includes investigations of both one-way and three-way bulbs.

The module that is most grounded in both the *National Science Education Standards* and the *Benchmarks for Science Literacy* is "It's a Colorful Life." The idea for this module came from the seeming inconsistencies between the primary colors of light and the primary colors used by artists and printers. In developing this module, I found that color materials did not adequately demonstrate color-mixing concepts. This led to my creating a series of useable colored films and color wheels. (The color poster that resulted from this work appeared on the cover of the April 1999 issue of The Physics Teacher.) Throughout this module, I noted the relevant science benchmarks so that the teacher could easily see how the investigation relates to them.

At the workshops where I have presented these modules, teachers have made many excellent suggestions. Since the modules are printed in small quantities, I can revise them frequently in response to comments from teachers and scientists as well as my own new insights and ideas.

Writing and presenting these modules continue to lead me to interesting activities and more opportunities. For instance, the Explorations in Materials Science and Line of Resistance modules were revised in collaboration with the Institute for Chemical Education (ICE) at the University of Wisconsin. ICE is currently selling these modules nationwide. With the support of the GASEF, I have traveled to ICE to present these modules to a National Science Foundation-sponsored summer materials workshop for the past three years. Also, I was asked to perform the technical review for a middle school course on electronics developed by the Lawrence Hall of Science and funded by the National Science Foundation.

These endeavors have greatly enriched the depth and breadth of my knowledge of science. The understanding that I have gained as a result of developing these modules has improved my ability to perform my everyday research and development work. In addition, this "hobby" of mine has led to great enjoyment and satisfaction.

Lawrence D. Woolf is a physicist at General Atomics, where he is involved in the development of thin film optical materials. Among his numerous writings are two articles for The Physics Teacher *magazine. He helped write the winning proposal for a $1.5 million grant from the National Science Foundation for the PISCES K-6 program in the San Diego area.*

JUMP ONLINE Information about the modules mentioned in this article is available on the GASEF web site (www.sci-ed-ga.org) or link via the online version of this magazine (enc.org/focus/partners).

Projects that Work

Partnering with local industry to solve real problems brings chemistry to life for high school students.

by Maureen P. Boino, Pittsfield, Massachusetts, High School

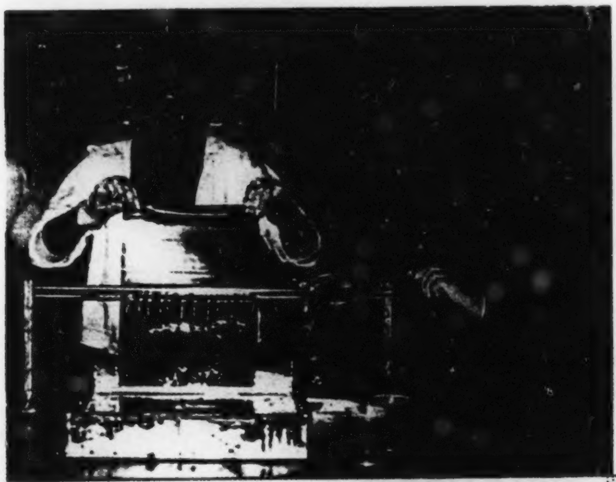
Through the national High Schools that Work initiative of the Southern Regional Education Board and a local Berkshire Applied Science Educators (BASE) grant, I participated in an externship during the summer of 1997. Since then, one of my major goals has been to help my students learn to apply the chemistry that they learn in my class. My students begin each year knowing they will learn the principles of chemistry throughout the year and in the spring they will work with a local business to solve a real-life problem that business has encountered.

My students have worked on numerous projects with local industries including GE Plastics and Interprint, Inc. This year my students once again worked with Interprint, a producer of designed paper that is used for laminating purposes on furniture, flooring, signs, and slot machines.

Different Kinds of Learning

In addition to chemistry, students must learn other lessons before they tackle an industrial problem. For example, students need to learn to work as a team and that takes practice. In one team-building activity, student groups solve a murder mystery in the chemistry lab. Another activity requires students to give blindfolded teammates explicit directions on how to tie a tie or put on a pair of pantyhose. The students love the activities and learn how important it is to listen to others in a team-centered project.

As the time for the project approaches, it is important for students to know something about the business and its products. Students research the company and write a short paper about it.



The next step is the first site visit. Each student is matched with an employee of the business who will serve as mentor. Then students receive a written description of the problem as well as an explanation of their assigned department's role in working on the solution.

Students spend seven days with their mentors and learn how to function as a team member. They accumulate data, get samples to test back at the school chemistry lab, and establish their own hypotheses. Best of all, they get their hands dirty and see firsthand how chemistry applies to real-life problems.

The Mary Maple Problem

Last year, Interprint presented the students with the following problem. A customer wanted to print a hardwood paper design called Mary Maple on a 200-pound paper, much heavier than Interprint had previously used. The customer also wanted to use new red inks. The problem? As the paper ran through the press, a "bleaching effect" was occurring in the center of the rolls, making the design look blotchy.

Why was this happening? Was it the ink, the paper, a combination, or the design itself? Was there a need for extender in the ink process or was the problem in the design cylinders?

One group of students discovered that the base paper that rolls through the press has a coating that allows the ink to be absorbed by the paper. A careful inspection of the base paper in the Quality Assurance department allowed students to see that the coating was uneven. Their suggested solution was to get a new shipment of base paper that was coated evenly.

In the meantime, another group of students working the presses hypothesized that the unusual heaviness of the paper exerted increased pressure on the doktor blade of the press, creating a bend in the blade. They reasoned that the pressure had to be adjusted to achieve an even spreading of the ink as the paper traveled over the design cylinders on the press.

Once the seven days at Interprint were over, students came back to the classroom to test their theories. They finally agreed a combination of excessive pressure and poor-quality base paper was causing the problem with the run of Mary Maple. Working as a team, students developed a PowerPoint presentation to explain their ideas to Interprint personnel. The project was evaluated by everyone involved and was counted as the students' final exam grade.

The partnership was culminated with a luncheon where everyone involved exchanged stories about the experience. There was a wonderful community feeling between students and industry leaders.

I believe this kind of project is an invaluable experience that allows students to see their talents and knowledge put to the ultimate test of practical use. As a teacher, I am gratified to see science truly come to life for these 16-year-olds.

Maureen P. Boino is a chemistry teacher and chair of the science department at Pittsfield High School, Pittsfield, Massachusetts. Email mboino@pittsfield.net

Thirty Years and Counting

This school-business partnership is entering its fourth decade of kindling elementary school students' interest in science. Find out how it has enjoyed such success and longevity.

by Douglas Llewellyn, Rochester City Schools, Rochester, New York
and Eugene Wicks, Xerox Science Consultant Program, Webster, New York

Like a good marriage, a successful partnership is created when both parties agree on common interests and needs. In establishing a school-business partnership in science, the Rochester City School District and the Xerox Corporation found a common interest in providing role models in science and technology for students in grades three through six, as well as opportunities for hands-on investigations and creative thinking. The intent was not to make a scientist or an engineer of each child but rather to expose students to basic concepts of science and the logical thought processes that are required for the field of science.

The Xerox Science Consultant Program (XSCP) involves more than 100 Xerox scientists, engineers, and technicians who are granted paid release time to conduct hands-on experiments and activities twice a month in the partnership schools. These volunteers are called consultants.

The program started in 1968 when a small group of scientists and engineers began presenting science projects to students in inner-city schools. These projects were designed to supplement the school's instructional program by providing a wide range of materials not readily available to teachers and to stimulate student interest in science. The program was originally sponsored by the American Chemical Society and the Rochester Council of Scientific Societies. In 1971, Xerox became the sponsor of the program.

Organization of the XSCP

A program manager, a Xerox employee, provides program planning and direction in collaboration with Xerox management and the school district. A program coordinator, also employed by Xerox, manages the day-to-day operations of the program. The coordinator schedules the consultants and manages the science kits that the consultants take out to the schools.

The consultants usually work in teams of two. The teams are assigned to two classrooms at a school. The prime objective of the consultant is to challenge, stimulate, and motivate students by using hands-on kits correlated to the school's science curriculum. The classroom teacher coordinates the sequence of the kits with his or her long-range instructional plans. The teacher remains in the classroom during the consultants' visit.

In selecting and pairing classroom teachers with consultants, emphasis is placed on working with new teachers who demonstrate a need to increase their capacity to teach science. Classroom teachers who accept an XSCP consultant are asked to make a multiyear commitment to working with that consultant.

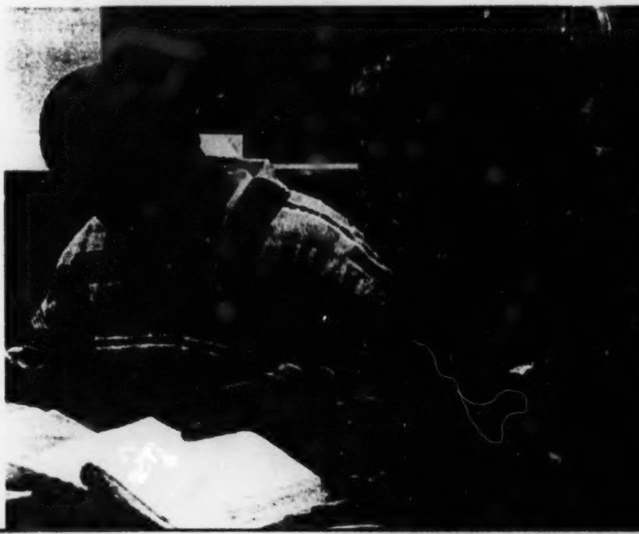
To ensure coordination within the Rochester City School District, the district's director of science works in cooperation with the XSCP team to select participating schools, provide orientation sessions and instructional strategies to the consultants, and align the XSCP kits with the district's science curriculum.

The XSCP Kits

Central to the program are more than 40 kits that provide hands-on experiences for students. Kits provide consultants with materials, lesson plans, and teaching suggestions. The school district provides many of the consumable supplies and materials for the kits through the district's science center. Sample kit titles include States of Matter, Mystery Powders, Probability, Kitchen Physics, and Flower Dissection.

After the consultants and the classroom teachers decide on the kits to be used throughout the year, the XSCP coordinator works with the consultants to make the kits available when needed. The coordinator is also responsible for refurbishing the used kits and preparing them for the next use.

During the early 1990s, the program was expanded to include the Webster, New York, Central School District and several other public and parochial schools in the area. In the 1998-99 school year, XSCP provided 93 consultants to 13



public schools. More than 3,000 students received two visitations a month for eight months (October-May)—nearly 50,000 contact hours per year. Since 1968, the program has reached more than 25,000 students.

Special Events

In addition to the bi-monthly classroom visits, the program invites students to participate in special events. The Invention Convention provides an opportunity for students to think creatively and solve problems. During the Invention Convention, students are encouraged to solve a problem from their own experience by working individually or as a team. In-class competitions are held at the school level and finalists compete against student finalists from other XSCP schools at the Xerox facilities.

Another event, the XSCP Challenge, offers a competitive atmosphere in which students demonstrate scientific principles of engineering and structures. For example, students might compete to build a structure of straws and paper clips that could hold the greatest amount of weight.

The yearlong program culminates with an Evening of Recognition during which students, parents, teachers, consultants, and others celebrate the students' achievement. Xerox and school officials present awards to students for their success in the Invention Convention and the XSCP Challenge, and for exemplary participation in the classroom program.

Keys to Success

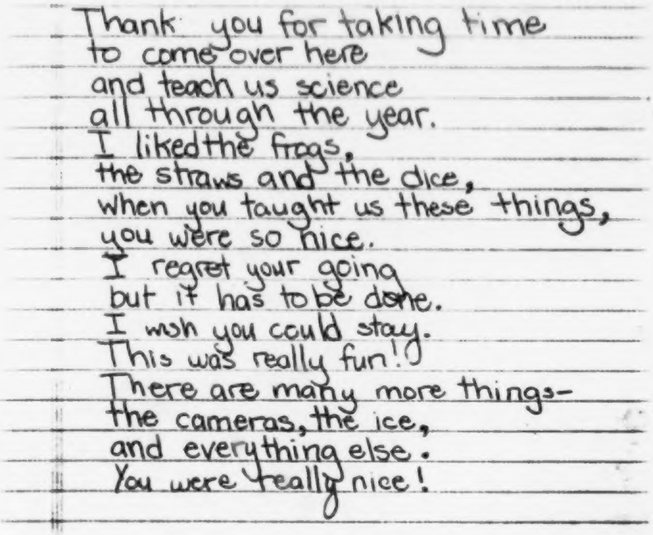
After more than three decades, XSCP stands out as a model for longevity. Its success has been contingent upon several guiding principles:

- Seek a commitment from the top levels of school administration and corporate management. Be sure the top levels are kept abreast of the program's development and successes.
- Concentrate on a few schools. Focus on those schools and teachers who demonstrate a long-term commitment to improving their practice.
- Find time for the corporate and school district coordinators to meet and plan regularly. Hold regular breakfast or luncheon meetings to discuss long-range plans for the program.
- Provide recognition for all program participants.
- Offer workshops that will help business partners understand how children learn and the dynamics of classroom interactions.
- Coordinate the partnership program with the schools' instructional goals in mind. Success in sustaining a long-term partnership only occurs when the program supports and complements the schools' teaching and learning goals.
- Work with committed people. Find people in both organizations who share the beliefs and values of the partnership.

Rewards for the Consultants

What is the motivation for scientists, engineers, and technicians to find time in their work schedules to become XSCP consultants in elementary school classrooms? Often consultants respond by saying, "I get a kick out of seeing a sense of wonder on kids' faces when they discover something new." Other consultants comment that they hope to dispel young people's stereotypes of a scientist's work. But generally, most say it's the feeling of accomplishment they receive in teaching science and the level of appreciation children provide.

During the last lesson of the school year, Beth, a fourth-grade student, came up to Donna, her Xerox consultant, and placed a folded piece of paper in her pocket. Later, Donna pulled the note out and read this poem from Beth:



Thank you for taking time
to come over here
and teach us science
all through the year.
I liked the frogs,
the straws and the dice,
when you taught us these things,
you were so nice.
I regret your going
but it has to be done.
I wish you could stay.
This was really fun!
There are many more things–
the cameras, the ice,
and everything else.
You were really nice!

For Additional Reading

Sussman, A. ed. (1993). *Science Education Partnerships: A Manual for Scientists and K-12 Teachers.* San Francisco, CA: University of California.

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From Flowers to Computers

Classroom teachers can initiate business partnerships that make a real difference for their schools.

by **Julia W. Maccarone, Edgewood Middle School, Merritt Island, Florida**

When I transferred to my present teaching assignment four years ago, I went from a new, modern building to an older, slightly smelly, but noble structure. My reasons for moving were sound—a shorter commute meant more time with our new baby. However, I couldn't help but feel that there had to be something I could do to help spruce up the place a bit.

My arrival happened to coincide with that of the new principal, Vernon Loyd, who also wanted to make the old school a place everyone could be proud of. Determined to begin by improving our outward appearance, I asked the bookkeeper if we had any business partners who might be willing to work with students on a landscaping project.

Her answer was no, and I was amazed! Our school is literally across the street from a Home Depot store, and because my brother-in-law is a Home Depot store manager in another city, I was aware that the corporation has a formal program, Team Depot, for working with local schools. With the principal's permission, I contacted Home Depot. The store happily agreed to donate plants as well as join with the school in a partnership.

Emboldened, I looked around our community, and saw a number of other businesses that I thought would be good partnership prospects. To date, we have a total of six business partners.

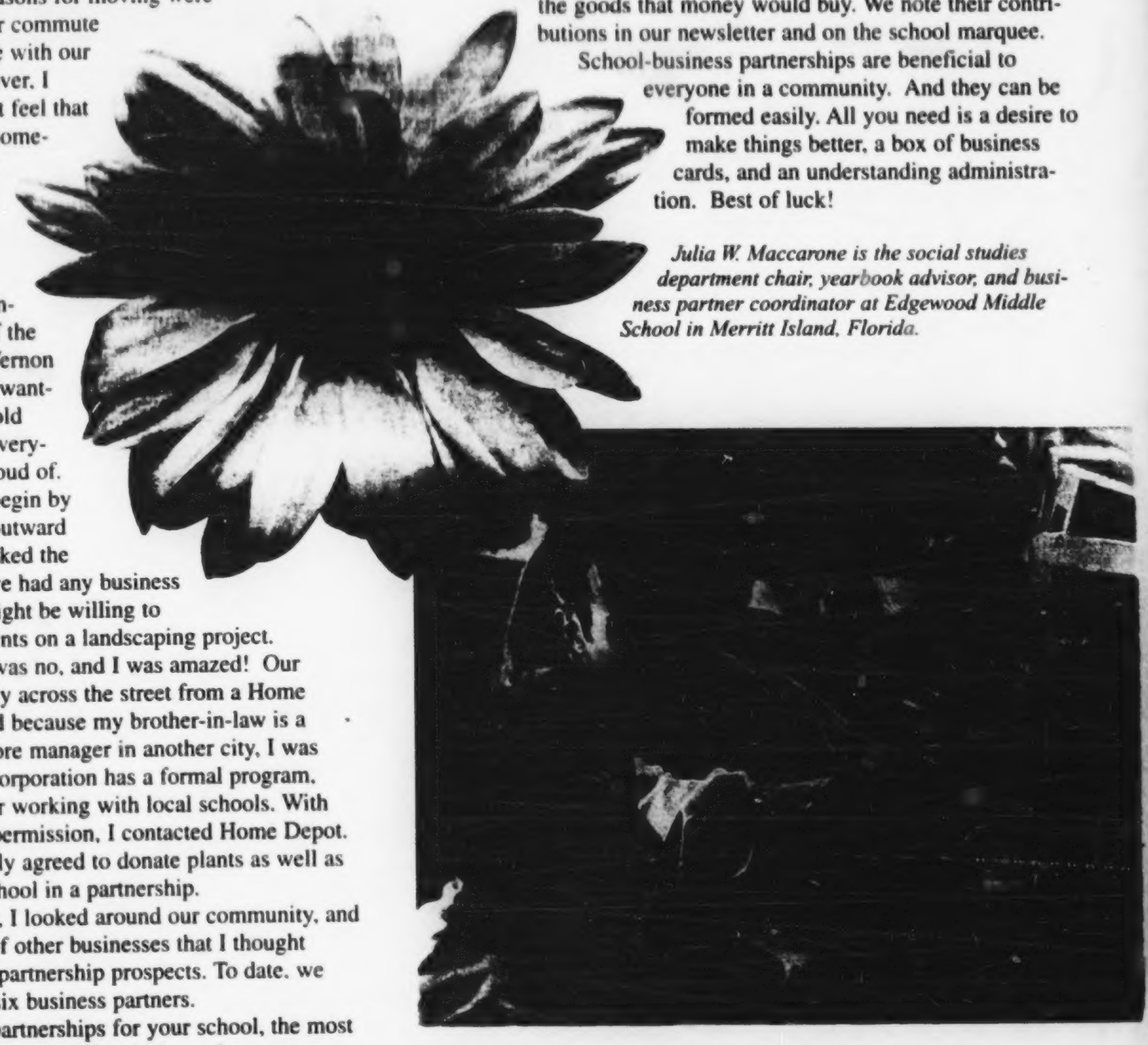
In building partnerships for your school, the most important thing to remember is that a few partners who can truly help your school are better than dozens who have no real interest. I chose to approach businesses that offered goods or services that met a need in the schools. The chain department store Target provides a variety of products for the school clinic and the home economics classes; a Barnes and Noble bookstore gives discounts to students and allows us to use their facility; and a local graphic design firm, Tormoen and Associates, spruces up the school newsletter. CiCi's Pizza frequently donates pizza—a powerful motivator for students and teachers alike.

Our largest partner is Johnson Controls Worldwide, maker of everything from space shuttle components to air conditioners. Along with training and volunteer services, the company has contributed computers, office supplies, and footballs to the school.

We rarely ask our partners for money; instead, we ask for the goods that money would buy. We note their contributions in our newsletter and on the school marquee.

School-business partnerships are beneficial to everyone in a community. And they can be formed easily. All you need is a desire to make things better, a box of business cards, and an understanding administration. Best of luck!

Julia W. Maccarone is the social studies department chair, yearbook advisor, and business partner coordinator at Edgewood Middle School in Merritt Island, Florida.



Teens Take a Healthy Interest in their Communities

A university-community partnership provides inquiry learning for underserved students and professional development for teachers while addressing the health concerns of all residents.

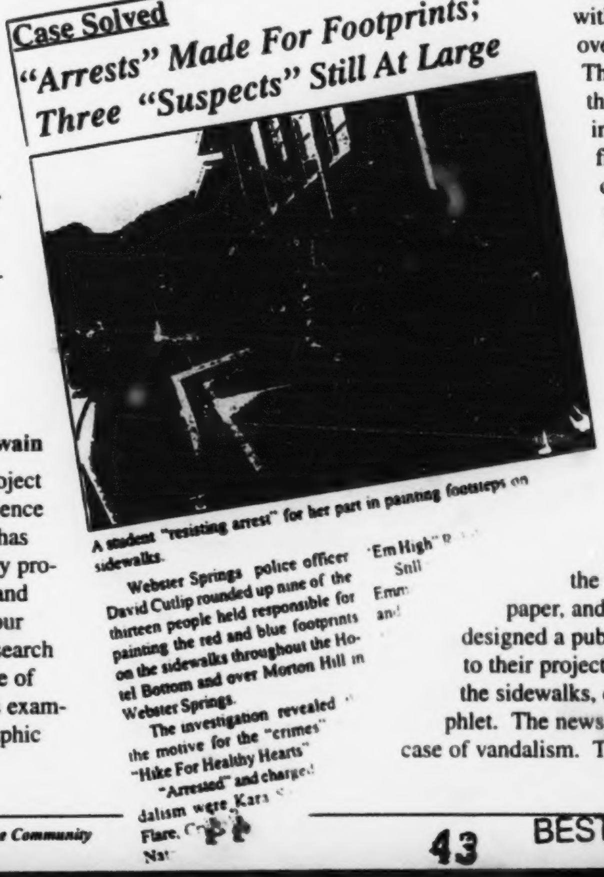
by Genevieve Bardwell, Cathy Morton-McSwain, Jill Hyde, John Lewis, Priscah Simoyi, and James Rye, Health Sciences and Technology Academy, West Virginia University, Morgantown

Will your blood pressure improve if you stop smoking?

How does music that teenagers listen to affect their hearing?

These are two of more than 100 research questions investigated by high school students participating in after-school clubs sponsored by the Health Sciences and Technology Academy (HSTA), a community partnership program administered by West Virginia University (WVU). The community-based clubs are just one component of HSTA, which also includes summer institutes on the WVU campus and a comprehensive teacher professional development program. (See sidebar on page 41 for details.)

A principal goal of HSTA is to increase college enrollment of underserved high school students, with the ultimate goal of increasing the number of health care providers in rural West Virginia communities. Program evaluations show that initial results are very promising (McKendall et al., in press; Clark, 1999). Just as exciting are the benefits to students, teachers, and their communities in increased learning and improved health, as the following stories written by HSTA teachers illustrate.



Case Solved

"Arrests" Made For Footprints; Three "Suspects" Still At Large

A student "resisting arrest" for her part in painting footsteps on sidewalks.

Webster Springs police officer David Cutlip rounded up nine of the thirteen people held responsible for painting the red and blue footprints on the sidewalks throughout the Hotel Bottom and over Morton Hill in Webster Springs.

The investigation revealed the motive for the "crimes" "Hike For Healthy Hearts"

"Arrested" and charged dalism were Kara Flare, Na

'Em High"
Still
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and

Healthy Hearts for All

by Cathy Morton-McSwain

The Hike for a Healthy Heart project began as a result of students' experience at the HSTA Summer Institute and has evolved into a three-year community program to promote healthy lifestyles and decrease cardiovascular disease in our community. Beginning with the research question, "What is the leading cause of death in Webster County?" students examined courthouse records, a demographic study done by the local hospital, and state and national statistics from the Department of Human Health and Resources and the Centers for Disease Control. These preliminary searches revealed that cardiovascular disease was by far the leading cause of death.

The next step was to develop a survey, obtain written approval from WVU to conduct this research on human subjects, and distribute the survey to adults at local civic group meetings. The findings from these surveys pointed overwhelmingly to the need for education and increased physical activity in the community.

To address these needs, students designed a walking track that would be safe, simple, and convenient to use. It also was important to students that persons with heart disease could walk without becoming isolated and overexerted from climbing hills. Their planning resulted in a track that uses existing sidewalks and incorporates three levels of difficulty. With support of city council and equipment from the West Virginia American Water Company, the students measured the track. Finally, they designed a pamphlet to describe and publicize the track. These were distributed to community centers, restaurants, motels, and stores.

One year later, the students reviewed the project and realized that the track could be used more. With the help of city council, the local paper, and city police, the students designed a publicity stunt to bring attention to their project. They painted footprints on the sidewalks, color-coded to match the pamphlet. The newspaper covered the story as a case of vandalism. The town council issued a press release written by the HSTA students, and the police gave comments about the investigation to the paper. This continued for three weeks before "arrests" were made. The local paper carried the whole story with pictures of the students being arrested; the city judge declared the episode "a grave misunderstanding" and the City Council issued a proclamation that all citizens of Webster County should be walking to prevent heart disease.

HSTA students also created Just Jump, a program for elementary age students and a fundraiser for the American Heart Association. After three months of training and practice, the HSTA students began to conduct the program with fifth graders who learned jump-rope tricks and were encouraged to give up one unhealthy snack daily in exchange for a healthy snack.

The third year, the students continued both thrusts of the heart disease prevention program. Some volunteered at the new community health center where they could see that the pamphlets were distributed, and others put pamphlets at the local hospital and health clinic. Students also conducted the Just Jump program for all elementary children, preschool through eighth grade

The students in our HSTA club have learned so much: presentation and leadership skills, how to set and reach goals, and how to effect change. Because our community has seen such growth and self-confidence in these "once shy girls and boys," there has been great interest in the HSTA program. In response, our Board of Education now funds a Junior HSTA program for middle school students who are interested in science.

Is There Too Much NO_x in the Air We Breathe?

by Jill Hyde

Living in what we call the "chemical valley" because of the high density of industrial plants, my HSTA students were interested in air quality. In our science classes, we had been studying about stratospheric ozone and substances that contribute to the thinning of the ozone layer. Through research and discussing our project with WVU personnel, the students were surprised to learn that whereas stratospheric ozone is helpful, lower-level (tropospheric) ozone may cause respiratory problems for humans and other living things. The students proposed testing the air in their valley to detect the

More About HSTA

Developed in 1994, the Health Sciences and Technology Academy (HSTA) currently involves approximately 55 secondary teachers from 21 West Virginia counties. These teachers partner with West Virginia University faculty and professionals in their communities to provide academic enrichment to about 550 students. Approximately 25 percent of students served are African-American and many live in rural areas or are disadvantaged financially. HSTA programs include summer institutes and community-based clubs for students and professional development for teachers.

Student Programs

At summer institutes, teachers and WVU faculty (health and natural sciences, mathematics, and education) engage HSTA students in problem-solving activities that relate science to human health. The community-based component of HSTA uses after-school clubs as an opportunity for teachers to facilitate research investigations and community service projects that are chosen by students. These clubs respond to the need to extend science education to community settings (Donahue et al., 1998, Gallagher & Hogan, 2000) and allow teachers and students to experience "the power of informal learning experiences" (National Science Teachers Association, 1998, p. 154).

Professional Development

The HSTA program includes the opportunity for teacher participants to earn a Master's degree through the Department of Educational Theory and Practice at WVU (Rye, 1998). HSTA incorporates principles of effective professional development set forth by Loucks-Horsley (1999): learning for all students is at the core, pedagogical content knowledge is a principal focus, and sources of expertise outside of the school are used. Graduate courses, workshops, and on-going collaborations with WVU faculty have enabled teachers to enrich their knowledge in areas such as human nutrition, cardiovascular disease, neuroscience, DNA manipulation, histology preparation, experimental design, electronic concept mapping, and other information technology applications (Campbell & Meyers, 1997; Hildebrandt & Brown, 1998, 1999; Rye, Bardwell, Hu, 1999). HSTA professional development emphasizes a paradigm shift from teacher- to student-centered instruction. Emphasis is on learning science through investigation (Peterson & Jungck, 1988; National Research Council, 1996).

presence of substances that might affect respiration and tropospheric ozone.

We made arrangements with the National Institute for Occupational Safety and Health (NIOSH) to get dosimeters for testing nitrogen oxides (NO_x—the precursors of tropospheric ozone). A dosimeter contains two testing receptacles: one for nitrogen dioxide (NO_2) and the other for nitric oxide (NO), both of which are measured in parts per million (ppm). Each student received three dosimeters and was assigned a number so that the test results would be anonymous. The students were instructed to hang one in the room of their home where the most "burning" takes place, one in the room where they spend most of their time, and one outside. At school, we hung one in the boiler room, one in the second floor hallway, and one outside in a tree. After seven days, the students gathered the dosimeters and sent them to NIOSH.

A NIOSH representative met with us to explain the results. The students were surprised to find all the results of their tests were within safe limits. We also compared our results with those of another HSTA club further north in West Virginia, which had obtained similar results. What did this prove? Only that the air was safe the week we tested it. We are planning to run the tests again over a wider area and extended time frame. We presented our results at the annual HSTA Symposium and also placed second in the Kanawha County Science Fair.

The students were excited about this project because it addressed concerns within the community about living near the chemical plants. They researched their topic using the library and the Internet and learned about experimental design and presentation techniques. A mathematics teacher worked with them on analyzing their results with box and whisker plots and on how to find the mean. All of this added up to a winning project and a lot of learning.

Genevieve Bardwell, HSTA curriculum coordinator, plays a leading role in providing professional development and serving as a resource to HSTA teachers.

Cathy Morton-McSwain, a veteran junior high school science and HSTA club teacher, recently served as Teacher-In-Residence for the HSTA program.

Jill Hyde is a veteran junior high school science and HSTA club teacher. She has served as curriculum specialist for the Appalachian Rural Systemic Initiative and is a member of the HSTA Joint Governing Board.

John Lewis is a veteran high school science and HSTA club teacher. He currently serves as principal for Rainelle Elementary School.

Priscah Simoyi, a registered nurse and WVU faculty member, assists with health-related HSTA projects and manages a National Institutes of Health Science Education Partnership Award that funds a portion of HSTA.

James Rye, WVU faculty member in the Department of Educational Theory and Practice, serves as advisor and instructor to HSTA teachers who are earning their Master's degree through HSTA participation.

For more information about HSTA, visit the web site (nt-htsa.hsc.wvu.edu/health) or contact James Rye at West Virginia University, P.O. Box 6122, Morgantown, WV 26506 or call (304) 293-3442 x1326. Email: jrye@wvu.edu

An earlier version of this article was presented at the January 1999 International Meeting of the Association for the Education of Teachers of Science in Austin, Texas. This paper is based in part on work supported by a Science Education Partnership Award (RR-12329-01) from the National Center for Research Resources, National Institute of Health. HSTA programs are part of the Keeping Kids in School Program, which is the national dropout prevention and career enhancement program funded by the Coca Cola Foundation.

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Local Support Provides Student Challenges

A partnership of high school teachers, university faculty and staff, and industry representatives provides an exciting opportunity for students to apply their knowledge of scientific principles in a laboratory setting.

by Ray Del Greco, Hopewell High School, Aliquippa, Pennsylvania,

Bernie Durkin, Ambridge High School, Ambridge, Pennsylvania,

and Lynn Kistler, Riverside High School, Aliquippa, Pennsylvania

Questions. Answers. Questions. Answers. Many science competitions are geared toward students who can remember facts.

Our local group of science teachers envisioned a competition that would challenge students' reasoning and application of scientific principles, not just their memories. We recognized that often the students who are most successful in class discussion and on tests are not necessarily the best laboratory students. In addition, we wanted to reward students who are well rounded in a variety of the sciences.

With these ideas in mind, the Midwestern Pennsylvania Association of Science Teachers (MidPAST) established the Science Challenge Laboratory Competition. The competition has been a success thanks to a partnership with Penn State University Beaver Campus and NOVA Chemical Corporation, organizations that had collaborated with us in the past.

Checklist for Organizing a Laboratory Competition

4 months ahead	Make contacts for funding, location of the competition, and expert support. Check calendar for SAT and ACT dates and other conflicts.
3 months ahead	Prepare and send information and registration forms to schools in the area. Send multiple copies to each school, addressing them to science teachers, gifted education coordinators, and principals.
2 months ahead	Develop and refine lab experiments.
2 weeks ahead	Inform host site of any special needs (chemicals to be prepared, special equipment to be used).
1 day before	Set up lab stations and make any last minute adjustments.
Competition day	
8:30-9:00 am	Student teams arrive and check in.
9:00-9:15 am	Brief introduction and instructions.
9:15 am-12:15 pm	Students work on lab exercises.
12:15-1:00 pm	Students have lunch while results are judged.
1:00-1:15 pm	Prizes and certificates are awarded.

Local Support Provides Student Challenges (continued)

MidPAST had held teacher workshops at Penn State University Beaver Campus, and we knew it would be a good location for the competition. The campus is centrally located and has several laboratory areas available for our use.

In addition, since most of the members of MidPAST are chemistry teachers, we sought the help of university faculty in the development of suitable experiments in other disciplines. The university science staff also provided assistance in preparing the chemical solutions and setting up materials and equipment for the laboratory exercises.

MidPAST had previously hosted speakers from NOVA Chemical Corporation and had also worked with NOVA's community outreach specialist. In planning the laboratory competition, we approached NOVA for funding to cover the cost of monetary awards for the winners, certificates for all participants, and a light breakfast and lunch prepared by a MidPAST member. Representatives of NOVA were also invited to observe the competition and to present awards to the winning teams.

We encourage other teachers to reach out to organizations in their local communities for support in enhancing their students' learning opportunities. Sidebars provide details on how we run our laboratory competition.

Veteran science teachers Ray Del Greco, Bernie Durkin, and Lynn Kistler founded the Midwestern Pennsylvania Association of Science Teachers. Goals are to foster communication among teachers, to provide continuing education in new lab technology for teachers, to offer positive science experiences for students, and to promote careers in science. Along with the Science Challenge competition, the organization has sponsored professional development workshops and a one-week summer science camp for students in fourth through sixth grades. For more information, contact Ray Del Greco at rdelgrec@icubed.com

Laboratory Activities

Since students in our competition complete six laboratory activities in three hours, selection of the specific experiments is important for the success of the event. Some of the experiments we use take less than 20 minutes, while others may require 40 minutes of work. It is the responsibility of the student team to determine the order in which they will work on the exercises, how long they will spend on each, and even if they will work together or if each team member should work on different experiments at the same time. In the end, the results are judged as a team effort.

Listed below are brief descriptions of experiments that we have used in the past. As we have learned which activities take more or less time, the experiments have changed. We are continually on the watch for experiments that would adapt well to the Science Challenge. It is important to rotate the laboratory activities each year as information about the competition is spread throughout the participating schools.

Physics

- **Force table:** Given two forces, students determine the third force to produce equilibrium.
- **Optics:** Students find the focal length of a lens.
- **Circuits:** Students determine the circuit diagram of four bulbs and two switches. Connecting wires are not visible. (This is used as a college physics experiment. Any single change affects at least two bulbs.)

Chemistry

- **Titration:** Students determine the molecular weight of two unknown acids, one monoprotic and the other diprotic.
- **Paper chromatography:** Students identify unknown ions based on the Rf values.
- **Determination of mole ratio of moles of reactants:** Students combine reactants in various ratios and measure the reaction temperature. By plotting a graph of ratio to temperature, the optimum ratio is obtained. (Vonderbrink, 1995)

Biology

- **Plant identification:** Students use a dichotomous key to determine the identity of several evergreens. (Everet & Eichhorn, 1986)
- **Biochemisty:** Given samples of sugars, starches and proteins, students determine the purpose of an iodine test, a Lugol's reagent test and a Biuret test. The students then identify which of these biochemicals are present in an unknown.
- **Analysis of proteins:** Students use a Spec 20 spectrophotometer (instructions are given) to develop a standard curve of protein using the Biuret method. Students then determine the concentrations of three unknowns from the curve.

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Partnership for Lifelong Learning

The chambers of commerce and educators in a five-county area draw their own blueprint for a wide-ranging community partnership.

by Barbara Pounders, Stephanie Sawyer, and Vicky Loggins, Northwest Alabama Education Partnership

The Shoals, Alabama, Chamber of Commerce knows that education is a key factor for enhancing the quality of life for citizens. That is why it took the lead in forming an education committee to develop a plan for lifelong learning in the region, a five-county area of northwest Alabama. The committee sought the help of teachers, school administrators, business owners, and students to create the Northwest Alabama Education Partnership (NWAEP). A grant from the Alabama Department of Economic and Community Affairs enables the partnership to fund a variety of programs.

NWAEP benefits some of the youngest citizens by establishing after-school homework centers in churches throughout the region. Here volunteer tutors help students complete homework assignments and work with them on skills. Individual attention and positive reinforcement lead to significant learning for youngsters who participate in the program.

One of the NWAEP's major goals is to serve young adults by creating a path from school to career. High school job fairs have grown in scope, attendance, and outcomes as a result. The partnership teamed with area colleges and community groups to organize and publicize the fair. Volunteers visited local high schools and taught students how to prepare for a job interview.

More than 40 employers were represented at the fair, which was open to job seekers of all ages. Some 1,300 took part in the year 2000 fair, ten times the 135 who attended in 1999. Available jobs ranged from entry-level to mid-level management positions. Individuals from the high school special education program participated in the job fair and have become valued employees in local businesses.

NWAEP also partnered with a local technical school in a building project. Students used donated materials to construct a house under the supervision of local construction contractors. Proceeds from auction of the house will be used to fund next year's project and to provide scholarships for the technical school's students.

The partnership currently has more than 1,300 volunteer commitments from more than 500 businesses and concerned individuals. Future goals are to build public awareness of educational services and to make lifelong learning a cultural priority in the community.

This fourth grader raised his reading level from two years below grade level to a year above during nine months of tutoring at an after-school homework center in a local church.

Barbara Pounders is the principal of R.E. Thompson Intermediate School in Tuscumbia, Alabama, City Schools. Stephanie Sawyer is the director of workforce development for the Shoals Chamber of Commerce of Colbert and Lauderdale Counties, Alabama. Vicky Loggins is the career services specialist at Northwest-Shoals Community College in Muscle Shoals.

Local businesses such as the McDonald's fast-food chain accept job applications at the annual job fair. Both employers and students benefit from the experience.

Science Summer Camp for Teachers

A corporate-sponsored professional development program helps teachers bring real-world science into their classrooms.

by Jane C. Crawford, ATOFINA Science Teacher Program, King of Prussia, Pennsylvania

Playing with crayfish and growing plants sound like ideal summer camp activities for a young boy or girl. But for teachers throughout the Philadelphia region, these pursuits mean a week of hard work and mind-opening, fun-filled exploration at the Science Teacher Program at ATOFINA Chemicals, Inc. (formerly Elf Atochem North America, Inc.).

For the past four years, the ATOFINA Science Teacher Program has been hosted at the company's Research Center in King of Prussia, Pennsylvania. The weeklong course aims to further the understanding and education of elementary and secondary school science teachers. Armed with science experiment kits and guided by chemical engineers and scientists, teachers learn new ways to illustrate scientific concepts.

Kathy Faddis and Donna Park, second grade teachers at the Aston, Pennsylvania, Elementary School, participated in the program in August 1999. Both teachers have 25 years of teaching experience and have been grade-level partners since 1984. They have worked together on numerous school and district curriculum, science, and evaluation committees, grade-level and school projects, field trips, and classroom projects.

Of Plants, Animals... and Research Labs

The Aston Elementary team selected the Structure of Life Kit, which contains two modules—one on hydroponic plant growth, the other on animal classifications using living examples. The plant module allows students to observe a plant's growth and development in a nutrient-rich solution. The other module focuses on how an unusual crayfish species can help students learn animal structure classification and territorial behavior.

Faddis commented, "We usually have frogs or fish in the classroom, but we got a rather large Louisiana crayfish to study. We had a lot of interesting experiences working with a creature that was totally foreign to us."

Other scientific principles explored by teachers at the camp included human body systems, electricity and magnetism, levers and pulleys, sounds, earth materials, and ecosystems. Each science kit contains enough hands-on material for a class of 30 students and meets National Science Education standards. The kits provide each teacher with eight weeks of science curriculum.

The two teachers worked side-by-side with ATOFINA research scientists in a variety of hands-on experiments. They also accompanied their scientist mentors to the research center to witness firsthand some of their research projects and even try some of the experiments. This part of the curriculum allowed the pair to delve deeper into their own experiments, which in turn gave them a better grasp of certain processes developed in the course material. For example, during their tour the team acquired the actual chemical compositions of the weed growth inhibitors and queried researchers about the role that certain elements, like potassium, play in hydroponic plant growth.

As part of the program, the teachers were asked to evaluate the course materials and make recommendations based on their classroom experience. At "graduation" all teacher teams made presentations to the class. All presentations were videotaped by the company; the Aston Elementary teachers are planning to use theirs at future parent-teacher events.

Collaboration from Every Angle

Both Park and Faddis used the camp to share insights with their peers, especially the newer teachers. Peer interaction also allowed the educators to compare their methods with those of other groups and adopt new strategies.

"I really appreciated the opportunity to talk to other teachers. Donna and I have been teaching for some time, and a lot of the other teachers there were new to the profession. It was helpful to be able to talk to them about some of their concerns and reassure them. 'Oh yeah, we've been there. We've done that,' we'd say," Faddis recalled.

"We learned so many ideas that can help us to be more enthusiastic about science and help our students to be more enthusiastic, too," Faddis said. For example, Park used to grow plants in plastic bags filled with vermiculite, which was susceptible to mold and not very student-friendly. The hydroponic plant module is equipped with germinators that allow the children to physically connect with the plants. Furthermore, advice from researchers has enabled Park to impede mold growth in the classroom.

Perhaps one of most important concepts stressed in the course was the collaborative nature of real-life scientific processes. "We do a lot of cooperative learning in the classroom and one of the things I liked about the program was it allowed us to show our students that scientists do work in teams and do collaborate," Park noted. Important safety equipment such as lab smocks and goggles "made students feel even more like scientists," added Faddis.

Science Literacy Begins Early

According to Park, science instruction in the lower grades is not often afforded the same measure of importance found in the middle and upper grades. Also, Park noted, there is a general public perception that elementary school teachers are not as proficient in math and science as secondary school teachers.

For Park, perhaps the most rewarding experience of the program was the chance to validate her belief in integrating scientific principles into all subjects. "It was very important for me to be able to meet with these scientists and tell them how I feel about the importance of science," Park said. "This program validated what we're doing in the classroom and its importance to the future of elementary science education."

According to L. Louis Hegedus, vice president of research and development for ATOFINA, this program has become an important part of the company's involvement in, and outreach to, local communities. "Teachers and scientists alike look forward to the program and recognize the vital contribution it makes to improving science literacy," he said.

In 2000, science teacher programs were held at 18 other communities in which ATOFINA has manufacturing operations, benefiting hundreds of teachers and thousands of students around the United States. Each teacher team was given a $500 donation toward the purchase of new science equipment.

At the time of this writing, Park was teaching the hydroponic module. "This was my first exposure to hydroponics and the kit materials are high quality," Park said, adding that some of her bush bean, pea, and corn plants grew to two feet in the first three weeks.

And how are the Louisiana crustaceans doing? "I still have the crayfish. They're coming in as our classroom pets and we're learning a whole lot about taking care of them," Faddis said of the adoption. What's more, the team's mentors will visit both classes and the crayfish.

"It was such a professionally rewarding experience that I would love to go back again," Park said.

Jane C. Crawford is manager, corporate communications for ATOFINA Chemicals, Inc., and director of the ATOFINA Science Teacher Program.

The ATOFINA Science Teacher Program has been recognized by the Industrial Research Institute for excellence in company-school partnerships that advance science and mathematics learning. For more information on the program, visit the company's web site (www.AtofinaChemicals.com).

Focus on the Collection

This section presents [illegible] from the full ENC record for [illegible] [illegible] issue's theme.

ENC's Collection and Catalog

School Partnering: A Plus for Students and the Community

by Carol Damian and Terese Herrera, ENC Instructional Resources

When we look back on the history of our country's schools and communities, we find a pattern of continuous change. In the early days of our nation, schools were rare except for those that were established for religious purposes. As the economy expanded and the need arose for advanced machinery, fertilizers, and health products, schools became places for training students to become productive members of an industrialized workplace. Schools became commonplace and work habits—getting to school every day and on time, following directions, reading basic information, doing simple computation, and writing legibly—were deeply embedded in the overall curriculum.

During the time of our manufacturing-based economy, most workers could find jobs laboring on the assembly line, processing paperwork, or tending to heavy machinery. Today, manufacturing and business processes look much different. We are in a period in which creativity, information, and automation are integral to successful business practice. Employees need to be long-term learners and global thinkers, adaptive to change and increasingly technology savvy. So, when schools plan for an overall system design, administrator/teacher professional development, and curriculum, it is their responsibility to be aware of business structure and career options that will likely affect their students. Schools can be designed so that they provide opportunities for the kinds of experiences that will best prepare students for success in their chosen careers. When schools and industry establish effective and meaningful relationships within a community, all students have better opportunities to become well prepared to be successful in the workplace.

As we consider recent changes in our economy, our social structures, and our career choices, it becomes clear that schools, as part of the greater community, need to be places of ongoing, well-planned change. In today's schools, students should learn the importance of reasoning, problem solving, and evidence-based decision making, for these are the intellectual tools of a democratic society. When the curriculum offers opportunities for students to tackle real problems, to experiment, to investigate, and to make rational decisions, schools are helping to prepare young people to be thoughtful, actively involved citizens, as well as effective participants in the workplace.

We selected resources for this issue of *Focus* that featured ways in which schools, communities, and business could share their common concerns and work together. We asked ourselves these questions as we searched for exemplary materials:

- How might schools, parents, communities, and businesses plan together to be sure students are well prepared for whatever they choose to do after they graduate from high school or college?
- How do we know what the standards are for good performance in business and in school curricula? How do these standards compare, and are they compatible?
- What current examples of curriculum programs or packages help connect the needs of the workplace to the things that students are doing and learning in school?
- Is there some way to provide professional development for educators to help them understand business procedures, policies, and change? What educational factors need to be bridged between school and businesses?
- What existing literature can help educators understand and evaluate the connections between schools and business? What are some exemplary informational resources?
- What are some of the promising math/science-related careers for students to consider as they think of their future? What school-based learning should they pursue to prepare for these careers?
- What kinds of learning and instruction will help prepare students to be well-informed citizens capable of rational decision-making?

Some of the items we chose for this issue are print materials and some are videos or CD-ROMs; still others are web sites. Whatever the medium, we tried to choose those materials that are relevant and thought-provoking for the purpose of improving schools through school/business/community collaboration.

We do not claim that this list of resources is comprehensive. We have carefully considered the materials that do appear here and think they are worthy of discussion in your school system. We hope that these discussions will lead to even more investigations on how to create and nurture meaningful school partnering in your community.

Featured Resources

Connecting Students to the Workplace

52 School-to-Work (6-12)

52 Connecting Mathematics and Science to Workplace Contexts: A Guide to Curriculum Materials (K-12)

52 W Make Girls Count in School-to-Work Programs: Leader's Manual (1-12)

52 Integrated Workplace Learning Project (9-12)

53 Learning That Works: Science in the Real World (9-12)

53 School-to-Work (9 and up)

53 Integrating Academic and Vocational Education: A Model for Secondary Schools (9-12)

Connecting Families and Education

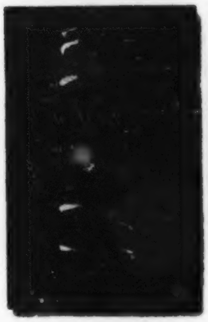
53 Parent Involvement in the Schools: Ideas That Work (K-12)

54 Employers, Families and Education (K-12)

54 A Business Guide to Support Employee and Family Involvement in Education (K-12)

54 School, Family, and Community Partnerships: Your Handbook for Action (K-12)

54 Family Involvement in Children's Education: Successful Local Approaches, An Idea Book (K-12)



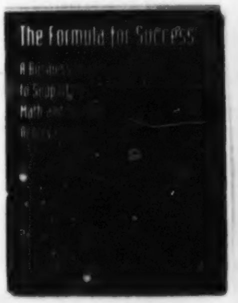
Creating Partnerships

55 Investing in Partnerships for Student Success: A Basic Tool for Community Stakeholders to Guide Educational Partnership Development (K-12)

55 The Business Roundtable Participation Guide: A Primer for Business on Education (K-12)

55 Effective Instruction: Linking Schools and Communities (K-12)

55 The Formula for Success: A Business Leader's Guide to Supporting Math and Science Achievement (K-12)



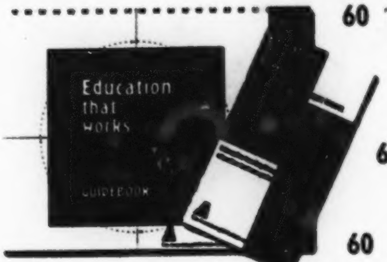
56 Finding Corporate Resources: Maximizing School-Business Partnerships (K-12)

56 Bridging the Gap: Initiatives Linking Education and the Workplace (9-12)

56 True Needs, True Partners: Museums and Schools Transforming Education (K-12)

56 Education that Works: The Saturday Academy Model (1-12)

56 A Compact for Learning: An Action Handbook for Family-School-Community Partnerships (K-12)



Partnerships in Action

Resources in this section were developed as a result of collaboration between education and business partners.

57 Disney's MathQuest with Aladdin (1-3)

57 Learn and Live (K-12)

57 Teachers Learning in the Community: A Field Guide (PreK-12)

58 Junior Engineering Technical Society (JETS), Inc. (9-12)

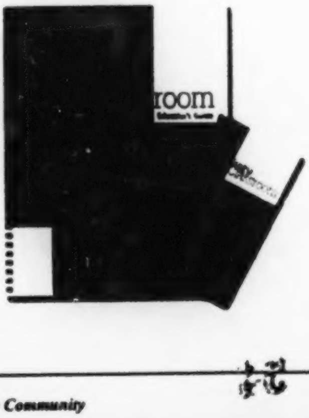
58 The Chalkboard: A Classroom Corporate Connection (K-12)

58 Bringing Industry-Based Science into the Classroom: A PACT Ambassador Guide (9 and up)

58 Tim Draper's BizWorld: Volunteers Teaching Kids About Business (3-8)

58 Toshiba/NSTA Laptop Learning Challenge (K-12)

59 Creativity in the Classroom: An Exploration (K-12)



Solving Workplace-Related Problems

Resources in this section involve solving math and science problems in real work scenarios.

59 Exploratorium: ExploraNet (K-12)

59 Thinkin' Science Zap! (3-6)

59 Investigating the Changing Earth (4)

60 The Science Spot (5-8)

60 Targets for Learning: Applied Technology (6 and up)

60 A World in Motion II: The Design Experience (7)

60 Issues, Evidence and You (7-9)

61 Students and Research: Practical Strategies for Science Classrooms and Competitions (7-12)

61 Mine Your Business: Linear Programming Paves the Way (9-12)

61 Applied Mathematics Targets for Learning: Preparing Successful Problem Solvers in the Workplace (9 and up)

62 Geometry in the Workplace 2 (9 and up)

62 Math in the Workplace (9 and up)

62 Problems in Construction (9 and up)

Careers

62 Careers Inside the World of Technology (7-12)

63 Dentists (PreK-3)

63 Breaking Through (7-12)

63 A Day in the Life of a Veterinarian (K-4)

63 Choosing a Career in Computers (7-12)

64 To the Young Environmentalist: Lives Dedicated to Preserving the Natural World (6-9)

64 Careers as an Electrician (7-12)

64 Exploring Biology: Careers and Issues (10 and up)

64 100 Most Popular Scientists for Young Adults: Biographical Sketches and Professional Paths (7 and up)

65 Real Science! (6-12)

65 Real Science! (7-12)

65 Careers in Science: From Archaeologist to Zoologist (8-12)

65 Your Career in Chemistry: Measuring Your Skills, Weighing Your Options (9-12)

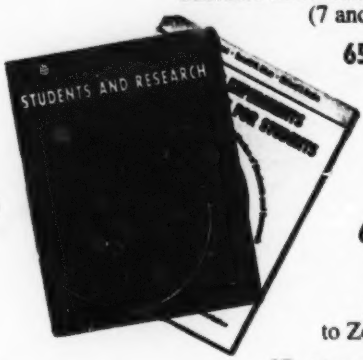
65 Wildlife Rescue: The Work of Dr. Kathleen Ramsay (4-6)

66 People Who Took Chemistry, That's Who! (7-11)

66 Setquest: Career Discovery in Science, Engineering and Technology (7 and up)

66 Careers for Chemists: A World Outside the Lab (9 and up)

66 She Does Math! Real-Life Problems from Women on the Job (6 and up)



67 Women of NASA (8-12)

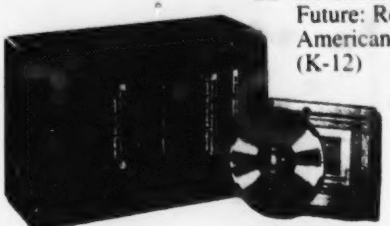
67 SPACES (Solving Problems of Access to Careers in Engineering and Science) (4-10)

67 The Space Publications Guide to Space Careers (5-12)

67 Sloan Career Cornerstone Series (6 and up)

68 Career Exploration Guide (9-12)

68 Careers in Math: From Architects to Astronauts (5-9)



Professional Development

68 Corporate Culture and the Attack on Higher Education and Public Schooling (K and up

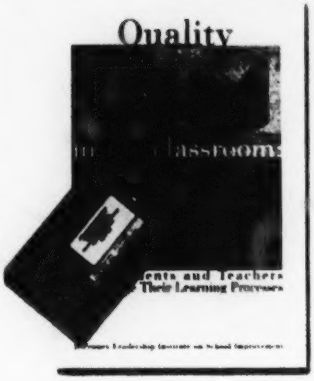
68 Reschooling for the Future: Restructuring American Education (K-12)

69 The Business of Education Standards (9-12)

69 Understanding the Changing Nature of Work and Education (K-12)

69 Quality in the Classroom: How Students and Teachers Co-Manage Their Learning Processes (K-12)

70 What Manufacturing Workers Need to Know and Be Able to Do... (9 and up)



Searching the ENC Collection of Resources

The resource descriptions printed in this magazine are abbreviated versions of the full catalog records available online. You can access ENC's vast collection of curriculum resources by visiting ENC Online (enc.org).

To find the online record for resources featured in *ENC Focus*:

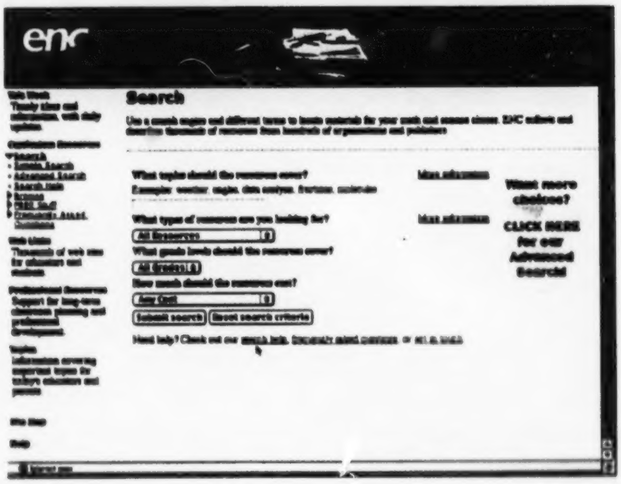
The easiest way to browse the online records of resources featured in an issue of *ENC Focus* is to go to our web site (enc.org) and select the link in the top right corner to ENC Focus Magazine. Select the title of the appropriate issue, then scroll down to the Focus on the Collection section. Finally, follow the links to the records of your choice.

To find other resources:

When you visit ENC Online (enc.org), the Curriculum Resources section in the left navigation bar offers both a simple and an advanced search with help features for each. The advanced search allows you to choose particular subject words, grade level, cost, and type of material to find exactly what you need.

For example, materials for this issue were found through the use of subjects such as partnerships, careers, and family involvement.

Also in the Curriculum Resources section is the Browse option. Find the subject you are interested in. Once a first page of results is returned, you can use the "Customize using advanced search" feature to further limit your search.



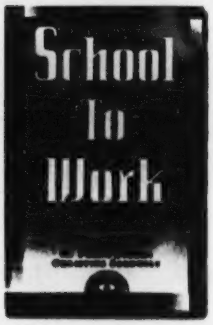
Additional assistance is available online (enc.org/resources/search/help) or by contacting the ENC Information Services staff by email (library@enc.org) or phone (614) 292-9734.

School-to-Work

Grades 6-12
1996
Author: Arnold H. Packer, Marion W. Pines with M. Frank Stluka, Christine Surowiec

Ordering Information
Eye On Education
6 Depot Way West
Larchmont, NY 10538
Email: info@eyeoneducation.com
(914) 833-0551 / Fax: (914) 833-0761
www.eyeoneducation.com

$42.95 per book (library binding)



The ideas in this book are intended to help readers build an educational system that integrates school and work. The goal is to provide students with a well-rounded education that helps them become productive citizens and hold jobs that give them satisfaction, security, and a decent living. The book deals with changes on five levels: school, work, counseling, systemic connections, and the community. It proposes what changes need to be made, describes promising practices, and explains the lessons that can be learned from four statewide plans. The authors address issues such as goals, motivation, and assessment. Throughout the book are tables and figures, and a directory contains entries for organizations that are school-to-work practitioners. (Author/JR) ENC-015829

Connecting Mathematics and Science to Workplace Contexts: A Guide to Curriculum Materials

Grades K-12
1999
Author: Edward Britton, Mary Ann Huntley, Gloria Jacobs, Amy Shulman Weinberg

Ordering Information
Corwin Press, Inc.
2455 Teller Road
Thousand Oaks, CA 91320
Email: order@corwinpress.com
(805) 499-9774 / Fax: (800) 417-2466
www.corwinpress.com

$32.95 per book (paperback)

From a hematology laboratory to an agricultural setting to a soda bottling company, the 23 programs reviewed in this book all draw connections between curriculum and the workplace. Each program reviewed is designed to motivate students by providing real-life, concrete situations to which they can relate. The book begins with a literature review that argues for connecting school science and mathematics curriculum to workplace contexts. This chapter also demonstrates how making such connections can fulfill aspects of the national curriculum standards. A brief overview is given of programs such as school-to-work, tech prep, occupational clusters, and career academies. Chapter two explains the different approaches used by each of the 23 programs to make workplace connections. The varied instructional treatments are sorted into six types of connections that include providing students with workplace experiences; adding to school curriculum the math or science topics found in the workplace; and using workplace examples to explain subject matter. In chapter three, the authors explain the selection criteria and discuss how each of the selected programs met those criteria. Chapters four and five review 12 mathematics curricula and 11 curricula that are for science or an integration of science with mathematics or technology instruction.

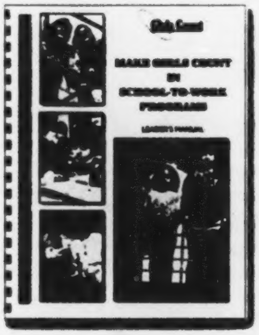
The reviews begin with an abstract and a content overview that includes a topic list, intended audience, and estimated duration of activities. The workplace connections section describes the instructional approach, curriculum components, and the type of materials required. This section also describes assessments, special preparations, and available teacher resources. Other information includes correlations to national standards, the table of contents, and a series of sample pages that illustrate student readings, activity sheets, and problem sets. The book concludes with a bibliography and a list of additional curricula. (Author/LCT) ENC-016854

Make Girls Count in School-to-Work Programs: Leader's Manual

Grades 1-12
1998

Ordering Information
Girls Count
225 East 16th Avenue, Suite 475
Denver, CO 80203
Email: GC@girlscount.org
(303) 832-6600 / Fax: (303) 832-7331
www.girlscount.org

$35.00 per leader's manual (spiral-bound)
Note: Order includes leader's manual plus 1 copy of Equity Threads: Serving All Students in School-to-Career Systems.



The training curriculum in this manual is for a workshop that addresses how best to serve girls in school-to-work systems. This material was created by Girls Count, a group promoting the creation of systems and attitudes that encourage girls to plan realistically for their futures, especially in the critical areas of math, science, and technology. Included in the manual is information on equity, all-girls program case studies, and successful program strategies. The workshop content is divided into segments that address four questions: Why focus on girls? What already works for girls? What do girls need? and What comes next? Within each segment are objectives, training procedures, logistical information, and master copies for overhead transparencies. The workshop covers current work trends for women, such as the fact that 77% of all working women are employed in those 20 occupations that are 80% or more female. It also addresses the fact that if a woman chooses a nontraditional occupation rather than a traditional one, she can expect to earn 150% more in her lifetime. This manual is intended to be used with another Girls Count publication, *Equity Threads: Serving ALL Students in School-to-Career Systems*, which focuses on society's collective obligation to ensure that all learners benefit from school-to-work programs. (Author/JRS) ENC-014184

Girls Count also produces a manual titled *Focus on Your Future* (ENC-014221), a middle- and high-school curriculum for classroom or extracurricular instruction on realistic and non-sex-stereotyped career planning.

Integrated Workplace Learning Project

Series: Connections: Linking Work and Learning

Grades 9-12
1996
Author: Dionisia Morales

Ordering Information
Northwest Regional Educational
Laboratory
101 SW Main Street, Suite 500
Portland, OR 97204
Email: products@nwrel.org
(503) 275-9519 / Fax: (503) 275-0458
Toll-free: (800) 547-6339
www.nwrel.org

$21.30 per set

Part of the Connections: Linking Work and Learning series, this student guide and companion teacher guide were developed to help teachers and other school staff collaborate with students and employers to plan integrated workplace learning projects. The teacher guide describes integrated workplace learning projects as self-directed, intellectually rigorous, field-based learning experiences in which students apply academic skills to solve real-world problems in the community. The reference guide is divided into sections that introduce the concept of integrated workplace learning projects, provide step-by-step instructions for their design, and contain two sample projects to help the teachers understand how to structure the programs. The student guide presents the project plan, the first part of which is the development of a proposal. The guide breaks this task down into three steps in which the students get an idea, choose a topic, and write a proposal. Included forms prompt students to reflect on issues such as their prior knowledge of the topic and how the project will benefit the community. The second part is an 11-step work plan in which students identify their products, list their resources, and make a timeline for the product completion. The plan ends with the students negotiating the project assessment methods and signing a learning agreement that defines the roles and responsibilities of students, teachers, and employers. A glossary defines terms used in the guide as well as others related to work-based learning. (Author/JR) ENC-017584

Learning That Works: Science in the Real World

Series: Teaching Teachers About Science

Grades 9-12
2000
Author: series producer, Robert Roche; producer, Susan Bellows
Publisher: WGBH Educational Programming

Ordering Information
WGBH Boston Video/Investigating Classroom
PO Box 2284
South Burlington, VT 05407
Fax: (802) 864-9846
Toll-free: (800) 949-8670

$99.95 per video

High school teachers and parents can use this video to examine some innovative high school science programs that emphasize connections between science curriculum and real-world applications within the community. The program stresses the importance of establishing educational programs that properly prepare young people to enter the twenty-first century workforce. In one vignette, viewers see high school students working on an environmental monitoring and advocacy project. Students collect water samples, interpret data, and discuss their findings with university mentors who guide and support them. The participants discuss how this contextualized learning approach has helped motivate and challenge them to achieve. In another vignette, viewers learn about a program run by the Cleveland Clinic where local high school students serve in academically demanding internships that teach them about the modern health care system. Students accompany doctors during examinations, learn about modern medical technologies, and conduct research on a topic of their own choosing. There are interviews with staff, teachers, and students that address how this approach shows students that what they learn in the classroom can be used to solve problems in the work place. The series was produced by the WGBH public television station and was funded by the National Science Foundation and the Department of Labor. (RJD) ENC-017276

School-to-Work

www.stw.ed.gov

Grade 9 and up
1994
Publisher: National School-to-Work Learning and Information Center

This web site is an outgrowth of the School-to-Work Opportunities Act of 1994 and highlights efforts to create successful school-to-work programs. The law provides seed money to states and local partnerships of business, labor, government, education, and community organizations to develop school-to-work systems. On the site, visitors will find information and support related to individual state initiatives that support the legislation. A searchable database includes examples of specific promising practices from around the country. An example of such a practice is the reform of one Pennsylvania high school's curriculum. The program was restructured into four major cluster areas that include 33 career pathways. The four clusters are: four-year college and university; applied technologies; applied engineering/mechanical technologies; and applied health/human services technologies. Every student enters the high school with an identified career objective on file and then selects a particular pathway congruent with that objective. A K-12 career development program and new career center collaborate to help students transition from school to careers. Two years after the implementation of this program, the school saw a marked increase in the number of students planning for post-secondary schooling. Other resources on the site include a resource library and links to related web sites. (Author/JRS) ENC-014643

Integrating Academic and Vocational Education: A Model for Secondary Schools

Grades 9-12
1998
Author: Alexandra Penn and Dennis Williams

Ordering Information
Association for Supervision and Curriculum Development
1703 North Beauregard Street
Alexandria, VA 22311
Email: member@ascd.org
(703) 578-9600 / Fax: (703) 575-5407
Toll-free: (800) 933-2723
ascd.org

$8.95 per book (ASCD member price)
(**$10.95** non-ASCD member price)

The case study presented in this book describes a school-to-work transition program designed to engage students' interest and prepare graduates for a rewarding life after high school. Based on the experiences of a successful school, the book describes a technology education program that integrates applied science and mathematics, computer-assisted design, and language arts into a career academy with a focus on aerospace technology. To clarify their idea of an integrated curriculum, the authors include examples of cooperative learning activities used in the school. These activities are designed to challenge students to apply academic concepts to real-world situations and to demonstrate how new technologies can help students learn to research, analyze, make choices, and plan. The authors also discuss the potential barriers to an integrated program and explain how specific practices can help teachers, business advisers, parents, and students break down these barriers and build an effective program. (Author/LCT) ENC-011562

CONNECTING FAMILIES AND EDUCATION

Parent Involvement in the Schools: Ideas That Work

Series: Hot Topics

Grades K-12
1997
Author: editor, Maike Philipsen

Ordering Information
Phi Delta Kappa, Inc.
PO Box 789
Bloomington, IN 47402
(812) 339-1156 / Fax: (812) 339-0018
Toll-free: (800) 766-1156
www.pdkintl.org

$30.00 per book (spiral-bound, paperback)

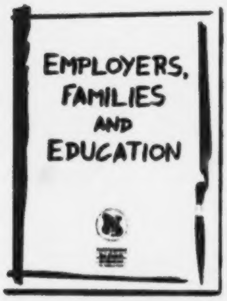
The 29 articles in this book provide general information about successful strategies for involving parents in their children's education. The book is part of the Hot Topics series, which compiles selected research articles and professional opinions to present a holistic approach to the many sides of an educational issue. In a sample chapter of this book, articles address issues related to family involvement at the middle and secondary levels, drawing on research that suggests it is at these levels of schooling where parental involvement declines and is most difficult to foster and/or maintain. These articles highlight characteristics of effective parent involvement programs, successful techniques used by principals, and the Right Question project, which is designed to help parents become supportive monitors and advocates for their children in school. The last three articles focus specifically on parental involvement issues for middle schools. Other chapters explore ways to increase parental involvement in diverse settings and with special populations, including the single-parent family. Throughout the book, the articles stress the need for committed leadership, nonjudgmental communication, and nonthreatening activities. References are included with each chapter. (Author/JRS) ENC-017398

Employers, Families and Education

Grades K-12
1997
Author: updated and revised, Margarita H. Colmenares, Ellen Galinsky, Jeanne Goldsmith, Robin Hardman, Tory Haskell, Susan D. Otterbourg, Leah Vosburgh

Ordering Information
United States Department of Education
Education Publications Center
PO Box 1398
Jessup, MD 20794
Fax: (301) 470-1244
Toll-free: (877) 433-7827
www.ed.gov

Free booklet



This booklet describes how and why employers have become family-friendly and are promoting family involvement in education. It highlights ideas and programs that encourage businesses and families to work together for strong, safe schools with clear standards of achievement. The booklet points out an economic reality: quality schools are good for businesses, as are communities that support education and students who are successful. Research accumulated over 30 years is cited to show the link between education achievement and parental and community involvement, regardless of socioeconomic levels. In one of the many examples of corporate support for education highlighted in this booklet, a hosiery manufacturer agreed to let guidance counselors visit work sites twice a month to meet with their students' parents. Counselors come prepared with students' records, report cards, and comments from teachers. They meet with each parent for 15 minutes, during which time the employee still receives pay. Inspired by the success of this program, the manufacturer now offers extra paid vacation days employees can use for such things as going on school trips with their children and participating in other school activities. The booklet also features a matrix correlating education-related employer policies—such as flexible schedules, support for parenting programs, and school improvement efforts—with 14 organizations that offer a wide range of practices that encourage family and employee involvement. These employers work with the Partnership for Family Involvement in Education, a grassroots movement that aims to promote children's learning through the development of family-school-community partnerships. Contact information is given for all organizations featured in this publication. References are also included. (Author/JRS) ENC-017566

A Business Guide to Support Employee and Family Involvement in Education

www.ed.gov/pubs/BusinessGuide/

Grades K-12
1997
Author: Susan D. Otterbourg
Publisher: United States Department of Education

Located on the US Department of Education web site, this guidebook highlights policies and practices that promote employee and family involvement in education, address workforce and student needs, and support education initiatives within communities. Intended for business leaders and their education and community partners, the material showcases applications and examples from employers who are actively participating in these efforts. The first section addresses the employer-and-employee concerns that motivate their involvement in education. These concerns include employee recruitment and retention, consumer loyalty, and quality time for family commitments. The document uses cost analysis to promote business involvement in family health and education. The second section contains a four-step plan for businesses to plan, develop, and manage initiatives that focus on their involvement in education. The steps include an analysis of employer, employee, and community needs; the establishment of a framework for the initiative; the development of a work plan; and the management of the initiatives. The third section examines what employers see as the scope of their future efforts, both within their organizations and within their communities. It provides examples of how companies such as Hewlett-Packard and United Airlines have planned to advance their initiatives. Finally, the appendix provides contact information for employers to help achieve goals related to employee and family involvement in education. Figures with sample worksheets and data are found throughout the document. (Author/JR) ENC-017576

School, Family, and Community Partnerships: Your Handbook for Action

Grades K-12
1997
Author: Jeff Passe
Publisher: Corwin Press, Inc.

Ordering Information
Corwin Press, Inc.
2455 Teller Road
Thousand Oaks, CA 91320
Email: order@corwinpress.com
(805) 499-9774 / Fax: (800) 417-2466
corwinpress.com

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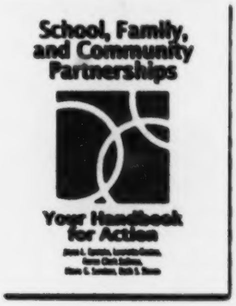
$69.95 hardcover edition



Designed to help people plan, implement, and maintain a successful partnership among schools, families, and communities, this book builds on the theory of overlapping spheres of influence to explain each partner's responsibility for children's learning and development. A partnership begins with the formation of a leadership team of teachers, parents, administrators, and community members and the development of a one- or three-year plan. There are practical suggestions for setting up training workshops, discussion groups, and end-of-the-year celebrations to support the team's efforts. The book gives six different types of suggested involvement for partnership programs, including volunteering, learning at home, and decision making. The challenges and likely results of each type of involvement are explained to help leadership teams evaluate which types are right for their schools. The goal is to eventually put all six types of involvement into action. There are agendas for training workshops, suggested materials for community and school presentations, and planning and evaluation forms. Information is included about partnerships at middle and high schools along with suggestions for further reading. (Author/JRS) ENC-012227

Family Involvement in Children's Education: Successful Local Approaches, An Idea Book

http://www.ed.gov/pubs/FamInvolve/

Grades K-12
1997
Author: Janie E. Funkhouser, Miriam R. Gonzales
Publisher: United States Department of Education

The US Department of Education provides this web site to help school administrators, K-12 teachers, policy makers, and parents build and nurture strong family-school partnerships. The site contains case studies of 20 successful education programs that illustrate how to help increase the involvement of low-income families in education and to help all families become more active participants in their children's education. Studies show that family involvement leads to better grades, more positive student attitudes, higher graduation rates, and increased enrollment in higher education. Ideas include school-based parent education programs and parent resource centers. The site describes two district-wide parent resource centers that help students and parents gain the skills and motivation needed to stay involved with their schools. Information on resources includes organizations and related publications. (Author/JRS) ENC-011838

Investing in Partnerships for Student Success: A Basic Tool for Community Stakeholders to Guide Educational Partnership Development

Grades K-12
1999
Author: Susan D. Otterbourg
Publisher: United States Department of Education, Partnership for Family Involvement in Education

Ordering Information
United States Department of Education
Publications Center
PO Box 1398
Jessup, MD 20794
(877) 433-7827/ Fax: (301) 470-1244
www.ed.gov/pubs/edpubs.html

Free book (paperback) with worksheets

In this book, author Susan Otterbourg describes a three-part continuous improvement process model in which partners plan, implement, and evaluate their collaborations. The model is designed for a broad range of community stakeholders in large or small collaborative efforts. The first part of the model, Partnership, Planning, and Development, contains five steps that begin with the recruitment and organization of education, business, family, and community stakeholders and end with setting and prioritizing objectives. Part two of the model involves the creation and implementation of action plans. In the third part, collaborators measure and report success and then review annual results and plan for the future. Each step of the model is completed when the organizers reflect upon a set of questions and complete a table, the templates for which are included. The book includes completed templates for each of the steps to demonstrate how they can be used. Each of the nine steps in the model is presented with its purpose, directions for completion, and questions for stakeholders to consider. (Author/JR) ENC-017875

The Business Roundtable Participation Guide: A Primer for Business on Education

Grades K-12
1991
Author: developed by the National Alliance of Business

Ordering Information
National Alliance of Business
Publications Orders Department
PO Box 753
Waldorf, MD 20604
Email: info@nab.com
(202) 289-2847 / Fax: (301) 843-0159
Toll-free: (800) 787-7788
www.nab.com

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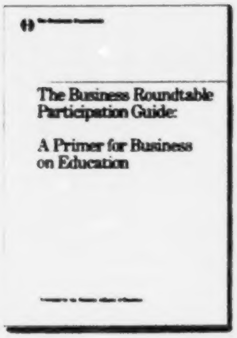


The Business Roundtable Participation Guide:

A Primer for Business on Education

This book encourages the business community to become involved in education and suggests areas of involvement, including curriculum, assessment, and technology. Each chapter defines the issue, explains its importance in today's society, and outlines the roles of business as well as those of state and local governments. One chapter about parental involvement begins with a call by the National Parents and Teachers Association (PTA) for collaboration between parents, teachers, and businesses. It explains that parental involvement includes promoting children's development, volunteering in schools, and emphasizing that education extends beyond the classroom. The book explains that today's parents need to act as their children's advocates to help bridge the cultural gap between home and school. A table lists the roles that parents, schools, government, and businesses can take to promote parental involvement. The chapter also addresses the barriers that prevent parental involvement. The book suggests that businesses can advocate government programs, provide financial motivation, and offer their employees benefits, such as parental leave and flexible hours, to increase their involvement in their children's educations. The appendices contain a summary of the Business Roundtable's essential components of a successful education system and a subject-specific list of additional resources. (Author/JR) ENC-017373

Effective Instruction: Linking Schools and Communities

Grades K-12
1996
Author: Doug Weihnacht

Ordering Information
WestEd Eisenhower Regional
Consortium for Science and
Mathematics Education
730 Harrison Street
San Francisco, CA 94107
(510) 302-4279 / Fax: (415) 565-3012
Toll-free: (877) 493-7833
www.wested.org

$15.00 per video

Effe
Instr
WestEd

In this video, three California schools provide the context for a discussion of the importance of integrating home and the community into the school curriculum. The highlighted schools use methods to validate the students' cultural backgrounds while engaging them in academic pursuits. One school with a predominantly Mexican American population presents a play that the students wrote. The play uses music composed by a local artist to illustrate the themes of gangs and drugs. Another of the featured schools has a diverse student population that speaks seven or eight languages. The students in this school study individuals such as Ghandi and Rosa Parks to help them learn that ordinary people can do extraordinary things. Students from the third school engage in social action projects to solve the relevant problems of their community using the information and skills they learn in school. The video emphasizes the importance of building on the students' knowledge and experiences from home and their cultures. (Author/JR) ENC-017217

The Formula for Success: A Business Leader's Guide to Supporting Math and Science Achievement

Grades K-12
1998
Author: Karen Lawson with Aimee Rogstad Guidera and Nelson Smith

Ordering Information
National Alliance of Business
Publications Orders Department
PO Box 753
Waldorf, MD 20604
Email: info@nab.com
(202) 289-2847 / Fax: (301) 843-0159
Toll-free: (800) 787-7788
www.nab.com

$15.50 per book (paperback)

The Formula for Success

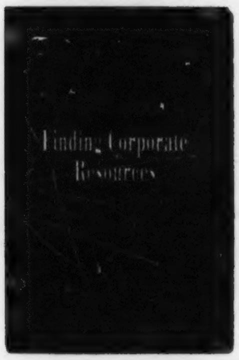
Drawing from data from the Third International Math and Science Study (TIMSS), this publication proposes ways to bolster poor science and math achievement among students in the United States. Cases are provided as evidence that entry-level positions in manufacturing firms require higher-level skills than high school graduates possess. One company explains that its janitorial staff need to understand more than just how to push a broom, because part of their job entails handling hazardous waste. The book provides six business strategies for improving student achievement, including articulating workplace academic skill requirements, supporting programs that expose students to the world of work, and encouraging employees to participate in local schools to help students achieve challenging academic standards. Examples from the policy and leadership level and in practice show how these six strategies can be employed. Questions are suggested to stimulate community discussions that lead to systemic reform. An annotated list of resources is included. (Author/JR) ENC-016043

Finding Corporate Resources: Maximizing School-Business Partnerships

Grades K-12
1996
Author: Gayle Jasso

Ordering Information
Corwin Press, Inc.
2455 Teller Road
Thousand Oaks, CA 91320
Email: order@corwinpress.com
(805) 499-9774 / Fax: (800) 417-2466
www.corwinpress.com

$18.95 per book (paperback)



For people who are interested in finding ways for corporations to fill in gaps within the educational system, this book describes how to identify and successfully acquire corporate resources in their communities. The first section explains the techniques and skills that help people gain access to the resources. The second section outlines the different resources corporations have that can be made available to the community. The author points out that executives often do not realize the resources that are available, and that the readers' knowledge could facilitate a mutually beneficial school and business relationship. For each resource category, the book provides 10 sections, including a sample challenge, a possible outreach solution, and examples of the resources. One chapter, for instance, focuses on information as one major corporate resource. It offers a scenario in which an English teacher wants to develop a unit on local economics. The chapter identifies possible contacts, explains how information is a commodity, and cites examples of information that could be helpful to the teacher. The pros and cons for both the corporations and the schools are listed. Appendices contain worksheets. (Author/JR) ENC-016628

Bridging the Gap: Initiatives Linking Education and the Workplace

Series: Standards Mean Business

Grades 9-12
1996
Author: Karen Lawson

Ordering Information
National Alliance of Business
Publications Orders Department
PO Box 753
Waldorf, MD 20604
Email: info@nab.com
(202) 289-2847 / Fax: (301) 843-0159
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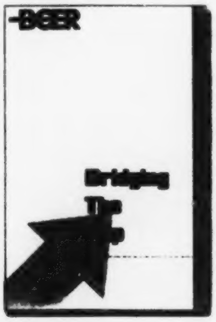
$9.00 per book (paperback)



A follow-up to the publication Standards Mean Business, this booklet is designed to show business leaders how they can work with educators and community leaders to bridge the gap between school and work. It explores the link between academic and workplace skill requirements and considers the consequences of a separation between business and educational communities. The booklet also highlights ways that individual companies, communities, and state and national coalitions can be involved in linking academic knowledge with workplace skill requirements. Practices are cited that facilitate the communication between business leaders and educators in their communities. The booklet also describes exemplary projects such as the Secretary of Labor's Commission on Achieving Necessary Skills (SCANS), which seeks to develop a common language for business leaders and educators. Also included are excerpts from academic and industrial standards. Descriptions are given of programs and tools that facilitate communication to reinforce academic and skill standards. Appendices include addresses for standard and program developers. (Author/JR) ENC-015860

True Needs, True Partners: Museums and Schools Transforming Education

Grades K-12
1996
Author: Institute of Museum Services

Ordering Information
Institute of Museum Services
1100 Pennsylvania Avenue
Washington, DC 20506
(202) 606-8536 / Fax: (202) 606-8591
www.imls.gov

Free book

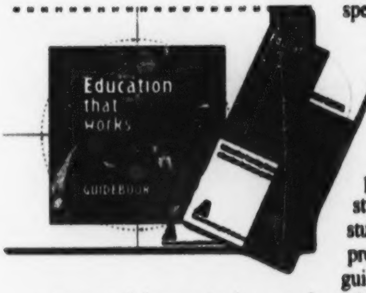
This book, developed for teachers and museum education programs, describes the results from the Institute of Museum Services (IMS) Leadership Initiative Program, which provided funds to help museums and schools form partnerships to enrich student learning. The book contains firsthand accounts of the 15 projects funded by the IMS Initiatives. It also outlines 12 factors that form the foundation of successful partnerships and concludes with two essays that describe the partnership experience from the perspectives of the museums and from formal education. A bibliography and list of museum awardees are included. (Author/LCT) ENC-012114

Education that Works: The Saturday Academy Model

Grades 1-12
1996
Author: producer, director, Julie Warrick
Publisher: Oregon Graduate Institute of Science and Technology

Ordering Information
Annenberg/Corporation for Public Broadcasting
PO Box 2345
South Burlington, VT 05407
(740) 389-5239 / Fax: (802) 846-1850
Toll-free: (800) 532-7637
www.learner.org

$32.47 per video
Note: The printed guide is no longer available.



This video details programs for the implementation of community-based mathematics, science, and technology programs. The programs include Saturday Academy, Futuremakers Inventor/Mentor Program, Apprenticeships in Science and Engineering, and Outreach Programs. The aim of this material is to show how to enlist the business and professional community in these programs for sharing professional expertise, equipment, and facilities with students. These how-to materials document the basics of starting such programs from planning, to promoting, to evaluating. Included are ideas specifically aimed at interesting girls in math and science and for dealing with environmental issues. The video highlights the interactive learning style with real-world problems central to the programs and presents case studies, including interviews with students, business sponsors, and program administrators. The guidebook outlines each type of program and documents the procedures that have made these programs successful. Also included are supplementary materials and literature references that provide background information. (Author/JRS) ENC-012495

A Compact for Learning: An Action Handbook for Family-School-Community Partnerships

www.ed.gov/pubs/Compact/

Grades K-12
1997
Author: Adriana de Kanter, Alan L. Ginsburg, Julie Pederson, Terry K. Peterson, Dorothy Rich

This 1997 electronic document is a handbook that is designed to lead family-school compact teams through the steps of building a partnership compact. Public Law 103-382 requires that schools covered in the law jointly develop a school-parent compact. A compact is defined as both an agreement that outlines how parents, the entire school staff, and students would share responsibility for student learning as well as an action plan for a family-school community partnership to help children get a high-quality education. The handbook recommends that the development of a compact be used as a way to involve parents and others who have not been closely connected to the school. The handbook provides information, strategies, examples, and checklists to help parents, educators, and community members develop effective, workable compacts. It includes activity sheets to assist compact committees in the creation and use of a compact. It also discusses how important it is for parents to understand the standards and to know what to expect from their child in terms of content and performance. A sample matrix organizes the commitments that the school, parents, and students could make in the compact. The document emphasizes that the creation of the compact is just part of a continuous cycle of improvement as it explains how to evaluate and strengthen the agreement. The appendix contains examples of compacts that schools have written, techniques to strengthen the community's commitment to supporting the school on specific issues, and lists of resources that could facilitate the compact development process. (Author/JR) ENC-017565

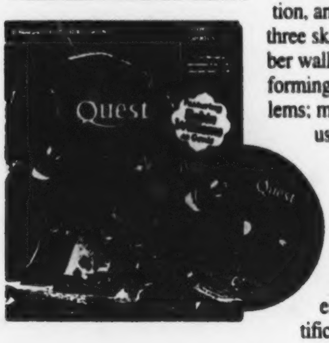
PARTNERSHIPS IN ACTION*

Disney's MathQuest with Aladdin

Grades 1-3
1997
Author: Disney Interactive

Ordering Information
Disney Interactive, Inc.
500 South Buena Vista Street
Burbank, CA 91521
Fax: (800) 965-5820
Toll-free: (800) 900-9234

$9.99 per CD-ROM package (Windows/Mac)
Contact publisher for system requirements.



Using colorful animated graphics, this CD-ROM presents an interactive adventure designed to build basic math skills as students meet math challenges set in the land of Aladdin. The goals of the adventure are to rescue Jasmine, save Aladdin, and find the hidden pieces of the magic lamp. With help and encouragement from Aladdin movie characters, students travel through an Eastern bazaar while exploring 18 problem-solving challenges or games that involve computation, patterns, estimation, and logical reasoning. Offered at three skill levels, the games include a number wall players must break through by forming addition and subtraction problems; mosaics that players complete by using line symmetry and geometric shapes; and logic games that require the discovery of patterns. Each player can save a record of his or her games and rescues in an individual passport, which can be called up and added to at the end of each game. Completion certificates can be printed. (Author/JRS) ENC-012236

Learn and Live

Grades K-12
2000
Author: George Lucas Educational Foundation

Ordering Information
The George Lucas Educational Foundation
PO Box 160
San Rafael, CA 95402
(415) 662-1600 / Fax: (415) 662-1605
Toll-free: (888) 475-4371

$5.00 per CD-ROM

This CD-ROM highlights methods for handling issues that plague schools and provides examples of situations in which these methods have been successful. The program contains an hour-long documentary, a 300-page resource book, and a Digital Toolkit that presents portions of the documentary with support materials. The documentary, hosted by Robin Williams, features footage of students in school settings and of national figures in business and education, including Bill Gates, Howard Gardner, and General Colin L. Powell. The program discusses topics such as project-based learning, emotional intelligence, school-to-career programs, and schools as community learning centers. Using the Digital Toolbox, viewers can watch a digital video clip profiling one of the topics and then link to background information, related web sites, articles from the *Learn and Live* resource book, and a glossary of education terms. For example, the section on project-based learning shows a class working on an entomology unit. Viewers see the students collecting insects, creating multimedia reports, and using two-way fiber optic technology to view their samples through an electron microscope and discuss their samples with an entomologist. The program offers discussion questions about the use of technology in the schools and suggests the Bugscope web site as a source for scanning electron microscopes. An article about peer critique circles is offered as a supplemental reference. All of the text-based resources in the Digital Toolkit can be printed. (Author/JR) ENC-017693

Teachers Learning in the Community: A Field Guide

Series: Connections: Linking Work and Learning

Grades PreK-12
1998
Author: Dionisia Morales, Leslie Haynes

Ordering Information
Northwest Regional Educational Laboratory
101 SW Main Street, Suite 500
Portland, OR 97204
Email: products@nwrel.org
(503) 275-9519 / Fax: (503) 275-0458
Toll-free: (800) 547-6339
www.nwrel.org

$19.60 per field guide (spiral-bound) with packet of reproducible forms

Part of the Connections: Linking Work and Learning series, this guide to professional development in the business workplace describes ways for teachers to engage in learning within a real-world context. The series is designed to facilitate work-based learning so that youth make informed choices and experience success in the world of work. This guide offers plans, implementation tools, and strategies to ensure that the activities are beneficial to teachers and to their students, schools, and communities. Workplace professional development, according to the authors, is a way to expand teachers' understanding of how academic and technical skills are applied in jobs. With this understanding, teachers can design their curriculum so that it is relevant to the global economy and accommodates the interests of the students. The first section of the guide discusses activities to shape the teachers' workplace learning through job shadowing, internships, and telementoring. The chapter defines each activity and outlines its purpose, the teachers' tasks, and the roles and responsibilities of the collaborators. A section about logistics describes the issues involved in planning and implementing professional development in the community, such as recruiting partners, balancing schedules, and keeping records. The tips are arranged in bulleted lists with a paragraph explaining each one. For example, the book suggests finding supporters in the community, using intermediaries, and targeting efforts to recruit community partners. The connections section discusses how teachers can integrate what they learn in the workplace into their curriculum. Margin notes throughout contain quotes and examples. Reproducible forms and materials accompany the guide. A glossary defines terms used in the guide as well as others related to work-based learning. (Author/JR) ENC-017563

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* Resources in this section were developed as a result of collaboration between education and business partners.

Junior Engineering Technical Society (JETS), Inc.

www.jets.org

Grades 9-12
1998
Author: JETS, Inc.

Designed for high school students interested in engineering, this site offers information about activities, events, programs, and materials that aim to connect students with engineers and demonstrate what engineers do. The site also illustrates how mathematics and science are used to solve technological problems and how the application of these subjects influences lives socially, politically, and economically. As an example, the site provides information on the Tests of Engineering, Aptitude, Mathematics, and Science (TEAMS) program. In this program, teams of high school students work together to learn about team development and problem-solving skills, often with an engineering mentor, and then participate in an open-book, open-discussion engineering problem competition. The web site also includes information and sample questions from the National Engineering Aptitude Search+ (NEAS+), a self-administered academic survey in which individual students determine their current level of preparation in basic skills (applied mathematics, science, and reasoning) for engineering. (Author/JRS) ENC-014523

The Chalkboard: A Classroom Corporate Connection

thechalkboard.com

Grades K-12
1998
Author: Classroom Corporate Connection

The Chalkboard is a web site designed to make it easier for teachers, students, parents, and community members to find information about free corporate education programs, curriculum materials, grants, scholarships, and services. The site features an online database that visitors can search by entering their grade level, subject, and geographic location. The curriculum materials include lesson plans, videos, and equipment, as well as programs that can be national or local in scope and occur more than once. The services include mentors, speakers, and tours of corporate facilities. Additional sources provide information about grants, scholarships, and employment. (Author/LCT) ENC-011441

Bringing Industry-Based Science Into the Classroom: A PACT Ambassador Guide

Series: Partnership for the Advancement of Chemical Technology (PACT) Ambassador Program

Grade 9 and up
1998
Author: series editor, Mickey Sarquis

Ordering Information
Terrific Science Press Center for Chemical Education
Miami University Middletown
4200 E University Blvd
Middletown, OH 45042
Email: cce@muohio.edu
(513) 727-3269 / Fax: (513) 727-3328
www.terrificscience.org

$10.95 per book

The Partners for the Advancement of Chemical Technology (PACT) Ambassador Program provides this guide to help any industrial scientist/technician, college chemistry instructor, or high school teacher demonstrate the relevance of science. The premise of the program is that many students consider the real world of science to be as remote and foreign as another country, and that it is in our national interest to show them what science is really like. This program brings industrial scientists, technicians, and engineers into partnership with high school teachers and college instructors to involve students in the scientific methods used in the chemical and allied industries. To improve the quality of chemical technology education, program phases include a classroom seminar, a tour of an industrial facility, and a laboratory experience based on industrial technology. The Ambassador Guide contains suggestions on how to set up a team as well as tips for implementing seminars, tours, and laboratory experiences. These tips are followed by guideline sheets that help team members (Ambassador, college facilitator, and teacher) define objectives. Guidelines also list special needs and materials for each phase of the project and help participants keep track of other important information. Evaluation forms are included in the appendix to help the team determine the success of the program. (Author/YK) ENC-013610

Tim Draper's BizWorld: Volunteers Teaching Kids About Business

www.bizworld.org

Grades 3-8
2000
Author: Tim Draper

This web site describes a program that brings volunteers into the classroom to teach students about basic business principles in a simulated business environment. In the multiday simulation, groups of students start and run their own businesses designing, manufacturing, and selling friendship bracelets. The simulation is designed to teach business concepts while engaging students in activities that reinforce math, science, art, and language arts. The program is team based and encourages cooperation among students. BizWorld is a product of a nonprofit organization dedicated to improving education by providing real-world experiences that teach children about business and entrepreneurship. Also found at this site is an online game in which players learn about the stock market and venture capital while selecting an organizational team to create and market greeting cards. Information at the site describes how to become a community volunteer to teach the BizWorld program; interested visitors can access a schedule for training sessions and information on ordering the free course materials kit. The kit includes string, play money and stock certificates, a training video, and course guide. In the course guide are teaching tips, options, and background information, along with a detailed outline of each day's instruction. (Author/JRS) ENC-017705

Toshiba/NSTA Laptop Learning Challenge

www.nsta.org/programs/laptop/index.htm

Series: Teaching Science, Math, and Technology with Laptops

Grades K-12
1999
Author: administered by the National Science Teachers Association

At this site, visitors will find lesson plans that were submitted by teachers and chosen as winners in the 1999 Toshiba Laptop Learning Challenge. The 20 selected lessons include science, mathematics, and technology components and take place in the classroom, in the field, or in informal science institutions. There are five lessons in each of four categories: Elementary Level, Middle Level, High School Level, and Informal Science. The lesson plans demonstrate how laptop computers can be used to engage students in hands-on learning of science and mathematics. All the featured lesson plans can be downloaded for free as PDF files. In a sample lesson plan for middle schools, students use model solar-powered cars and photogates connected to a laptop computer to investigate velocity, power, and the properties of solar cells. This lesson plan is typical of those featured and includes an abstract, full directions and contact addresses for the acquisition of materials, as well as a timetable and a description of how the lesson meets the National Science Education Standards. The site also includes a description of the program and some general information on using laptop computers in the classroom. (Author/RJD) ENC-016345

Creativity in the Classroom: An Exploration

Series: Creative Classroom

Grades K-12
1999
Author: executive producer, Kathy Franklin; writer/producer, Ron Ritchhart

Ordering information
Disney Learning Partnership
500 South Buena Vista Street
Burbank, CA 91521
(818) 567-5684
Toll-free: (800) 295-5010

Free video with educator's guide
To obtain this video free of charge, please send a letter on school letterhead briefly explaining how you would use the materials for professional development.

This video and accompanying educator's guide are designed to strengthen teachers' understanding and interest in creative and powerful teaching strategies. It was produced as part of the Creative Classroom Series, which provides a starting place for both individuals and groups of teachers to begin a dialog about what constitutes good and effective teaching and what makes a classroom a creative place. The first part of the video contains vignettes illustrating different types of creativity in classrooms at different grade levels. One vignette shows how a teacher immerses her students in real-world math as they bargain-shop at the grocery store, go bowling, calculate the distance to the mall, and make their own hula hoops. The second part of the video is designed to encourage an examination of teachers' techniques in creative classrooms by providing scenes that highlight exemplary approaches to content, approaches to teaching and learning, and activities that support students' creativity. The accompanying guide provides structure for individuals and groups to view and discuss the video in smaller segments. Each chapter in the guide begins with an overview of its issues and explains the focus and content of the related video segment. Several reproducible sections that serve to guide further viewing, discussion, and reflection follow this overview. An annotated list of related resources is found at the end of the chapter. The final chapter facilitates educators' thinking about the practical application of what they have learned. Quotes from American Teacher Awards honorees are found throughout the book. (Author/JR) ENC-017874

SOLVING WORKPLACE-RELATED PROBLEMS*

Exploratorium: ExploraNet

www.exploratorium.edu/index.html 1996

Grades K-12
Author: Exploratorium

At this web site, visitors will find online resources to support science education, virtual field trips to the museum, and special exhibitions that introduce online technologies. The Exploratorium is a museum of science, art, and human perception with more than 500 interactive hands-on exhibits. Three-dimensional exhibits offer experiential learning in 13 broad subject areas that include light, color, and sound; electricity, heat, and temperature; language; the senses; and animal behavior. Electronic versions of the exhibits enable students to experience a variety of optical illusions. They can manipulate a QuickTime movie to show how movement can blow a camouflaged animal's cover, and they can also conduct virtual genetics experiments on fruit flies. For teachers, the site offers instructions for creating miniature science exhibits that require inexpensive and easily available materials. Teachers will also find classroom activities and information on professional development workshops that focus on inquiry-based teaching and learning. In sample classroom activities, students can recycle some cans to make a musical instrument called a Bonko and observe some properties of light and color in a homemade bubbularium. Winner, ENC Digital Dozen, July 2000. Author/LCT) ENC-008389

Thinkin' Science Zap!

Series: Thinkin' Science

Grades 3-6
1998
Author: Edmark Corporation

Ordering information
Edmark Corporation
PO Box 97021
Redmond, WA 98073
Email: edmarkteam@edmark.com
Fax: (425) 556-8430
Toll-free: (800) 320-8379
www.edmark.com

$39.95 per CD-ROM package (Mac/Windows)
Lab packs and site licensing available. Contact vendor for further information.

This CD-ROM, developed for grades 3 to 6, provides a virtual laboratory where students can experiment with optics, sound, and electric circuits. The CD-ROM invites students to join rock stars Blaze, Riff, and Surge in a concert where students, acting as Guest Directors, control the light and sound system. However, lightning has just struck the theater and the control systems have gone haywire. Electrons are leaking from open circuits, and the light and sound systems also need repair. Students follow each character into his or her laboratory to learn how to fix the equipment and "earn" the components that they will use to repair the lightning damage. The Laser Light Lab features a virtual laser table where students reflect, refract, and absorb light by manipulating a variety of lenses, mirrors, filters, and barriers. In the SoundWave Studio, students see, hear, and control sound waves to make Boogiebots dance to a particular frequency or amplitude. In Surge's Electroloft, students tinker with batteries and light bulbs, wires and switches, and conductors and insulators to connect a variety of gadgets in series and parallel circuits. They also repair existing circuits by changing the battery terminals, locating short circuits, and removing nonconducting materials. Each laboratory features a Question and Answer tutorial mode as well as a free exploration mode. As students progress through the tutorials, they advance along a color coded Grow Slide to more challenging problems. The Adult Options allow users to set the slide at a specific level for further practice. Additional science content information is provided in an online encyclopedia that contains over 200 articles written especially for children. Once students have collected their components, they proceed to the concert stage where they use what they have learned to create their own multimedia concert with colored lights, sound effects, and other electrical wizardry. (Author/LCT) ENC-013504

Investigating the Changing Earth

Series: BSCS Science T.R.A.C.S.

Grade 4
1999
Author: project director, Nancy M. Landes

Ordering information
Kendall/Hunt Publishing Company
4050 Westmark Drive
PO Box 1840
Dubuque, IA 52004
Fax: (800) 772-9165
Toll-free: (800) 770-3544
www.kendallhunt.com

$11.99 per student book (paperback)
$38.99 per teacher's edition (paperback)

This teacher's guide and student book, designed for teachers and students in grade 4 as part of the Biological Sciences Curriculum Study (BSCS) Teaching Relevant Activities for Concepts and Skills (T.R.A.C.S.) series, contain nine lessons which introduce the students to the concepts of weathering and erosion and the differences between the two. The series provides a sequence of developmentally appropriate activities in which students actively develop concepts, inquiry skills, and problem solving skills in authentic science and technology situations. The students learn basic science concepts in the series' modules, each consisting of a teacher's guide and a student book. The science concepts are defined by the National Science Education Standards and the American Association for the Advancement of Science (AAAS) Benchmarks. Within each module, teachers can find lesson plans, assessment strategies, and a structure for collaborative learning. They will also find an instructional model that connects learning experiences and background content information.

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* Resources in this section involve solving math and science problems in real work scenarios.

Tables outline the materials needed, outcomes, and assessment indicators for each of the lessons. In one of this module's lessons, students discuss why the surface of the Earth is not flat if erosion is continuously taking place. An essay about Mount St. Helens acts as a springboard to a discussion about the changes in the Earth that a volcano causes. The students use a hard-boiled egg to model plate tectonics and the layers inside the Earth. A four-page biography of John Wesley Powell describes his adventures in the Grand Canyon and his theory explaining the canyon's formation. The student book has directions, background information, and drawings that illustrate the directions. Black-and-white photographs show students in school and adults on the job using the process skills employed in the module. The teacher's guide contains blackline handout masters and a list of additional related resources. (Author/JSR) ENC-014806

The Science Spot

theramp.net/sciencespot

Grades 5-8
1999
Author: Tracy Trimpe

This web site contains links and information for teachers who are interested in enriching their science classes. They can find lesson plans, activities, and worksheets for five different areas of science. One project in the biology section is a pond study in which the students analyze the biotic and abiotic factors in the environment, discern the characteristics of living things, and study the reproductive patterns of the animals in their samples. The project develops skills such as data collection, communication with peers, and mathematical calculation of the volume of the pond. The site also provides ideas about how to create and use a nature center as an outdoor living classroom. Tips about the acquisition, care, and classroom applications of hissing cockroaches are offered. Teachers can suggest management ideas to other teachers, choose scientific trivia for discussion starters, or look up additional resources using online links. One section of the site contains activities to help students understand the practical realities of adult life. Visitors can see activities and fundraising ideas designed for science clubs. (Author/JR) ENC-015464

THE SCIENCE SPOT

Targets for Learning: Applied Technology

Grade 6 and up
1999
Author: Vocational Instructional Materials Laboratory

Ordering Information
Center on Education and Training for Employment
The Ohio State University
1900 Kenny Road
Columbus, OH 43210
(614) 292-4277 / Fax: (614) 292-1260
Toll-free: (800) 848-4815 ext. 24277
www.cete.org

$35.00 per book

Developed as part of an Ohio School-to-Work Partnership prototype grant, this book contains a supplementary curriculum designed to help instructors prepare learners to solve technological problems in the workplace. The book defines applied technology as the basic technological principles of mechanics, electricity, fluid dynamics, and thermodynamics as they apply to machines, equipment, and mechanical systems. It also explains the Work Keys System for teaching and assessing problem-solving skills and describes an inquiry-based instructional model that uses a five-stage learning cycle. The next four sections of the book provide learning activities according to four levels of difficulty. A sample activity for beginners is a mechanics problem in which learners combine gears of various sizes to gain an understanding of the relationship between them. As an extension activity, they add an idler gear between the drive and driven gears. A more advanced problem helps learners improve their understanding of electric circuits by challenge them to build circuits that include motors or thermostats. For each learning activity, the book explains the scientific principle behind the problem and provides background information, vocabulary and materials lists, and reproducible student worksheets. Multiple-choice assessments and answer keys are provided. In addition, each activity is keyed to a list of science process skills and the state proficiency outcomes for grades 6, 9, and 12. The appendices contain annotated bibliographies, software and Internet resources, and contact information to suppliers of educational resources and materials. The appendices also provide a brief review of physics concepts and equations and state proficiency outcomes. (Author/LCT) ENC-013507

A World In Motion II: The Design Experience

Grade 7
1996
Author: Dan Dick, Bernie Zubrowski, Doug Haller, Shelley Isaacson, Cindy Char, Jan Ellis, Lorena Martinez, Brian Williams, Myles Gordon and Marilyn Quinsaat

Ordering Information
Society of Automotive Engineers
400 Commonwealth Drive
Warrendale, PA 15096
(724) 772-8513 / Fax: (724) 776-0890
Toll-free: (800) 457-2946
www.sae.org

Free kit with provisions that will be explained when you order. Now also called Challenge 2 & 3 (middle school)

Developed by the Society of Automotive Engineers (SAE), this multidisciplinary curriculum unit is one of three engineering design challenges that take the form of real-world design scenarios. Each challenge focuses student design teams, teachers, and volunteers from the professional community on the math, science, and technology concepts required to solve a design problem over an eight-week period. In this unit, a fictitious toy company, Mobility Toys, Inc. (MTI), is looking for designs for a new line of motorized, gear-driven toys. MTI requests written proposals, sketches, and working models of designs that meet specific requirements. In the unit, students complete activities that help them develop a proposal and a prototype for a toy of their own design. Through hands-on activities, students learn about energy, force, and friction. They also learn about simple machines, levers and gears, and torque. The activities touch on geometric concepts inherent in body design and performance, gear ratios, and the radius of a wheel. Students also learn data collection and retrieval techniques and basic statistical analysis. In addition, students practice public speaking and writing skills as they prepare their proposal and presentation for a review panel of teachers and volunteers. Sample activities ask students to measure the rim force transmitted by three different size driver gears and experiment with possible toy body materials to understand how they can be cut, shaped, and assembled. The teacher's guide provides background information, teacher and volunteer tips, and guidelines to help visiting engineers and other partners evaluate student work. Also included are duplication masters for student worksheets and assessments. Assessment activities include embedded assessments, open-ended response tests, and portfolios. Additional materials include an orientation video, a planning poster, and a classroom design poster. (Author/LCT) ENC-008426

Issues, Evidence and You

Series: Science Education for Public Understanding Program (SEPUP)

Grades 7-9
1995
Author: Robert Horvat
Publisher: SEPUP, Lawrence Hall of Science

Ordering Information
Lab-Aids, Inc
17 Colt Court
Ronkonkoma, NY 11779
Email: lab-aids@lab-aids.com
(516) 737-1133 / Fax: (516) 737-1286
(800) 381-8003
www.lab-aids.com

$90.00 per teacher's guide
$28.40 per student manual
$4,269.00 for the complete kit

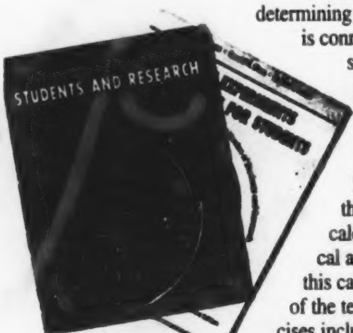
This full-year, inquiry-based, interdisciplinary chemistry course uses environmental issues to motivate students and provide a context for the science content and processes they learn. The course is divided into sections that cover the safety of the water supply, the availability and use of natural and invented materials, and energy sources and use. In a fourth section, students evaluate the environmental impact of building a factory in an island community. In one of the 65 activities in the course, students use a microbial growth medium to prove that a sample of untreated water contains microorganisms. Each activity contains the following components: an introduction to contextualize the activity; materials list; data processing suggestions to help students analyze, interpret, and display data; procedure; and questions to check understanding of key concepts. The teacher's guide provides an introduction to the SEPUP approach and guidelines for each activity. The guide also includes transparency masters, student reading assignments, quick checks for assessing student understanding, opportunities for formal assessments, and extension activities. The components of the assessment system include embedded assessments, journals, and rubrics. A materials kit is also available. (Author/LCT) ENC-008015

Students and Research: Practical Strategies for Science Classrooms and Competitions

Grades 7-12
2000
Author: Julia H. Cothron, Ronald N. Giese, Richard J. Rezba

Ordering Information
Kendall/Hunt Publishing Company
4050 Westmark Drive
PO Box 1840
Dubuque, IA 52004
Fax: (800) 772-9165
Toll-free: (800) 770-3544
www.kendallhunt.com

$32.95 per teacher edition (paperback)
$25.95 per student edition (paperback)



The emphasis in these two activity books is on practical laboratory strategies, inquiry learning and application of the scientific method. Also stressed are the basic principles of experimental design and the nature of variables, hypotheses and data analysis. The teacher's manual offers leading questions and includes additional references, ideas for modifying and extending each exercise, and tips on preparing students to enter local science fairs and competitions. Other topics include constructing data tables, writing reports, and determining statistical significance. Each activity is connected to specific NCTM and NSES standards and includes a list of required materials, a summary of the procedure to be followed, and a description of the data to be recorded as well as possible ways to analyze it. Many of the activities utilize the Texas Instrument's TI 83 graphing calculator as a problem-solving statistical analysis and display tool. The use of this calculator is described in an appendix of the teacher's guide. The laboratory exercises include study questions that challenge students to understand the process of inquiry itself rather than the content alone. Answers to the study questions are given as an appendix in the teacher's guide. In a sample activity, students record the temperature change in a beaker of water when calcium chloride is added and plot the results using the graphing calculator. They then answer questions designed to help them clarify and critique the experimental design, the choice of variables, and the data analysis. (RJD) ENC-017776

Mine Your Business: Linear Programming Paves the Way

Series: ThinkSharp Learning Experiences

Grades 9-12
2000

Ordering Information
Think Sharp
539 Rock Spring Road
Bel Air, MD 21014
(410) 893-5338 / Fax: (410) 893-5820
Toll-free: (888) 844-6520

$699.00 per kit
Order # EM-4
Note: Kit includes: 1 video, 1 teacher guide with blackline masters, and 2 CD-ROMs of linear programming software.

Using this curriculum module, students employ an algebraic process called linear programming to help a construction company find the most cost-effective way to mix hot asphalt. The module is part of the ThinkSharp Learning Experiences series, which offers supplemental mathematics units designed to motivate students by challenging them to solve real-world career problems. In this module, students view six video episodes with construction site footage and learn how to apply linear programming, one of the world's most widely used math concepts. Students also learn about making hot asphalt, a mixture containing various sizes and types of rocks called aggregates. At the end of each episode there is a mathematical challenge. For example, students use the data about the properties and costs of four aggregates to find a mix that satisfies the state's regulations. Graphics on the video show how to model this mixture problem with inequalities. Students then use spreadsheet software, provided with the teacher's guide, to find the optimal aggregate mix. In the final episode, students learn about sensitivity analysis and the widespread potential of linear programming applications to many industries. The teacher's guide contains reproducible student materials for exploring the application of linear programming in other settings. This module takes a total of about 11 hours of in-class and out-of-class time to complete all activities. (Author/JRS) ENC-017885

ThinkSharp® Learning Experiences
Mine Your Business –
Linear Programming Paves the Way
Teacher Guide

Applied Mathematics Targets for Learning: Preparing Successful Problem Solvers in the Workplace

Series: Targets for Learning

Grade 9 and up
1996
Author: Sheri E. Bidwell
Publisher: Vocational Instructional Materials Laboratory

Ordering Information
Center on Education and Training for Employment
Publication and Sales Office
The Ohio State University
1900 Kenny Road
Columbus, OH 43210
(614) 292-4277 / Fax: (614) 292-1260
Toll-free: (800) 848-4815x24277
www.cete.org

$35.00 per handbook (loose-leaf)

This resource binder contains authentic real-world math problems for secondary students and adult learners. The material is designed to help students learn strategies for solving math-related problems found in the workplace and is intended to supplement an existing curriculum. Problems feature work with quantity, money, time, measurement, proportions and percentages, and averages. This material was written for educators and trainers by teachers, industry trainers, and industry employees. The American College Testing (ACT) Work Keys System is used to divide the teaching of applied math topics into five skill levels. Work Keys is a national system for teaching and assessing workplace academic skills in secondary, postsecondary, and adult training programs. The five skill levels range from one-step computational problems to multi-step problems with complex, poorly organized information. For each level, there is a list of what the learner can do and the characteristics of the problems at that level. Supporting material in this binder addresses issues related to gender equity, motivation, and assessment. *Targets for Learning* was developed with reference to the *NCTM Curriculum and Evaluation Standards* (1989). Each section identifies the specific Ohio math proficiency outcomes that it addresses. Appendices include problem-based learning activities with rubrics, references, and applied math resources. (Author/JRS) ENC-017451

Geometry in the Workplace 2
Series: Applied Mathematics

Grade 9 and up
1992
Author: Center for Occupational Research and Development

Ordering Information
CCI Publishing
324 Kelly Drive
PO Box 21206
Waco, TX 76702
Fax: (254) 776-3906
Toll-free: (800) 231-3015
www.educatalog.com

$2.25 per student's edition
$22.95 per teacher's edition
$84.75 per video
Supplementary materials and curriculum sets also available. Prices may vary from state to state. Call for details.

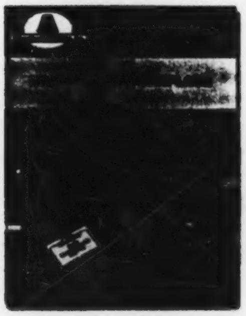
Applied Mathematics is composed of modular units designed to develop job-related mathematics skills of vocational students in high school. The set may be used in its entirety, or separate units may be selected and integrated into an existing vocational course. Each unit includes a video, teacher guide, and student workbook. This unit focuses on how to apply the principles of solid geometry to solve problems in the workplace. In the learning activities, students learn to: apply solid geometry to problems that involve the volumes and surface areas of cylinders, cubes, spheres, cones, and frustums of cones; apply solid geometry principles to solve problems normally encountered in the workplace; draw auxiliary diagrams to help solve for an unknown dimension or an unknown angle; and solve workplace problems in solid geometry that require a series of calculations to reach the final answer. The teacher guide includes an introduction to the material, a diagnostic test, suggested strategies for teaching, equipment lists and notes for hands-on activities, solutions to problem solving exercises, and an end-of-unit test. The student workbook provides an introduction to mathematics skills; laboratory activities; student exercises, which involve the areas of general problems, agriculture and agribusiness, business and marketing, health occupations, home economics, and industrial technology; and a glossary. The video illustrates mathematical applications in the world of work. (CCC) ENC-000073

Math in the Workplace
Series: Technology-Based Solutions

Grade 9 and up
1998
Author: guides by Lynn Geoffrey

Ordering Information
Educational Activities, Inc.
PO Box 392
Freeport, NY 11520
Email: learn@edact.com
(516) 223-4666 / Fax: (516) 623-9282
Toll-free: (800) 645-3739
www.edact.com

$295.00 per CD-ROM set
Set includes 3 CD-ROMs (Graphs, Measuring, and Lines and Angles) and guides. Individual CD-ROMs with text sold at $119.00 each.



This set of three CD-ROMs contains a series of interactive skills development and tutorial programs designed to motivate students by providing practical job-related mathematics activities. The mathematics explores graphing, measurement, and the basics of geometry related to lines and angles. Job-related fields include agriculture, building trades, business and marketing, health occupations, home economics and industrial technology. Students choose to work in areas that interest them most; each vocational field contains up to six different sets of questions. A tutorial lesson introduces each mathematical topic and is followed by the job-related activities. A management system breaks down scores so that the teacher can tell the level of student proficiency for each type of math function in the program. Reproducible worksheets accompany each program. In a sample of content, the *Using Graphs, Charts, and Tables* CD-ROM is designed to teach the student to read, interpret, and create pictographs, bar graphs, line graphs, and circle graphs. In the tutorial, the student interprets graphs representing sales data for a company over a nine-year period. After the tutorial, the student may choose to work in a vocational area with problems such as reading a circle graph that shows the breakdown of expenses for a plumbing company. The student receives specific, interactive feedback and reteaching as needed for each incorrect answer. Correct answers are acknowledged and the program continues. (Author/JRS) ENC-017456

Problems in Construction
Series: Walch Workplace Skills

Grade 9 and up
1994
Author: William Webb Sprague

Ordering Information
J. Weston Walch Publisher
321 Valley Street
PO Box 658
Portland, ME 04104
Email:
customer_service@mail.walch.com
(207) 772-2846 / Fax: (207) 772-3105
Toll-free: (800) 341-6094
www.walch.com

$11.95 per book

This activity book is centered around the task of forming a general construction company. In the simulation, students apply decision-making skills and the ability to use dimensions, schematic drawings, and scales. They use formulas to find the circumference of circles, the areas of triangles and circles, and the hypotenuse of right triangles. Estimating construction costs is one function of a construction supervisor. Many problems do not have a right answer, since only the best answer is necessary in many construction situations. Using the memory key on a calculator is incorporated into solving the problems. A summary of the series is provided in the accompanying series guide. (Author/LDR) ENC-006193

Problems in Business
Problems in Manufacturing
Problems in Construction

Other titles in this series include *Problems in Manufacturing* (ENC-006192), which introduces a shipping and receiving supervisor who must master basic measurement skills and practice drawings, scales, and graphs. *Problems in Business & Office* (ENC-006194) introduces Don, a summer assistant in a personnel department at a financial institution.

CAREERS

Careers Inside the World of Technology
Series: Careers and Opportunities

Grades 7-12
1998
Author: Jean W. Spencer

Ordering Information
The Rosen Publishing Group
29 East 21st Street
New York, NY 10010
(212) 777-3017 / Fax: (888) 436-4643
Toll-free: (800) 237-9932

$17.95 per book (hardcover)

Secondary students can use this book to help them evaluate technology fields as possible career choices. This book explains the job requirements and benefits for careers in five different technologies: electronic technology, manufacturing technology, health care technology, technician service jobs, and communications technology. More than 150 technology careers are listed alphabetically in a table. Students reflect on their own personalities and read personal stories to help them determine if they are well suited to jobs in technology. The book describes the tasks performed by technology professionals such as integrated circuit board technicians, respiratory therapists, and automotive technicians. It explains that people can prepare for technology-related jobs at work, in the military, and in community colleges. Each chapter ends with questions for the reader to consider. The book includes job application tips, a glossary, and a list of additional resources. (Author/JR) ENC-016329

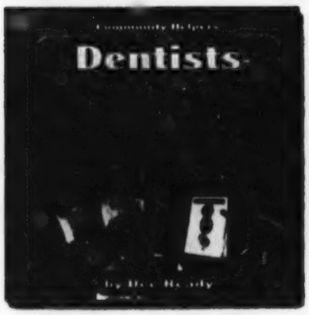
Another title in this series is *Careers Inside the World of Health Care* (ENC-016313), which explains the job requirements and benefits for careers in different health care fields. The book gives several options for health care-related fields, such as midwifery, acupuncture, pharmacy, dentistry, medicine, and audiology.

Dentists
Series: Community Helpers

Grades PreK-3
1998
Author: Dee Ready

Ordering Information
Capstone Press
151 Good Counsel Drive
PO Box 669
Mankato, MN 56002
(507) 388-6650 / Fax: (888) 262-0705
Toll-free: (800) 747-4992
www.capstone-press.com

$12.95 per book (library binding)



This book introduces young readers to dentists and their work, tools, and education. It is part of the Community Helpers series, which emphasizes the helping nature of such familiar careers as health care workers, farmers, and zoo keepers. Each book in the series features large-scale, color photographs and easy-to-read text to help readers understand the basics of each occupation: what the people do and wear, what equipment they use, where they work, and whom they help. In this book, students learn that dentists fix teeth by filling cavities or straightening crooked teeth. They also learn about the protective clothing (masks and gloves) worn by dentists and the tools they use, such as small mirrors and X-ray machines to examine teeth. The photographs depict dentists of various races and genders in dental schools and with patients. The book concludes with an activity that encourages students to count their teeth and compare their results with babies and adults they know. A glossary and bibliography of books and Internet sites are also included. (Author/LCT) ENC-014968

Also included in this series is *Astronauts* (ENC-014967), which discusses how astronauts work in space and use computers to control spaceships from the ground. Another book, *Doctors* (ENC-014969), talks about how doctors try to help people with injuries and illnesses.

Breaking Through

Grades 7-12
1993
Author: producer/director, Peter Robinson

Ordering Information
INTELECOM Intelligent Telecommunications
Attn: Marketing Dept.
150 E. Colorado Boulevard, Suite 300
Plaza Center
Pasadena, CA 91105
Email: intelecm@cerf.net
(818) 796-7300x113
Fax: (818) 577-4282
Toll-free: (800) 576-2988
www.intelecom.org

$29.95 per video

Viewers of this video are presented with the variety of career choices made by some women scientists and how these women have achieved balance in their lives. Women from many different backgrounds explain the reasons they were drawn to science, such as a love of learning, an enjoyment of math, and an affinity for problem solving. Careers in geophysics, electrical engineering, and biomedical engineering are among the scientific paths that women in the video pursued. The video highlights how three women are treated by their contemporaries, enjoy sports and hobbies, and nurture their relationships with family and friends. The final section of the video shows what girls can and should look for in scientific careers. (Author/JSR) ENC-015030

A Day in the Life of a Veterinarian
Series: Kids' Career Library

Grades K-4
1999
Author: Mary Bowman-Kruhm

Ordering Information
PowerKids Press
29 East 21st Street
New York, NY 10010
Fax: (888) 436-4643
Toll-free: (800) 237-9932

$17.26 per book (library binding)

This storybook, part of the Kids' Career Library series, is a simplified account of the responsibilities and typical activities of a veterinarian. Readers follow Dr. Marcia Vandermausse as she makes house calls, examines sick animals, and talks to their owners about their symptoms. Her patients include a dog with its head stuck in railings, a cat with a cold, and a ferret that needs a rabies shot. Medical details are kept to a simplified minimum throughout the book. The series is designed to introduce young readers to selected aspects of the working world. Difficult words are sounded out phonetically and explained in a glossary to help reading comprehension. The information is presented in the form of a commentary that describes the activities of one typical working day. The commentary is illustrated with numerous full-page color photographs that show different kinds of people doing their jobs. (RJD) ENC-016457

Other books in the series include:

A Day in the Life of a Doctor (ENC-016454), a story in which readers follow Dr. Robin Miller as she meets with patients, talks to them about their symptoms and decides on a course of treatment. Her patients include a boy with a virus, a woman with a mild head injury, and a girl who is nervous about receiving a shot.

A Day in the Life of an Emergency Medical Technician (ENC-016455), which follows flight paramedic Dan as he prepares for work, checks his equipment, and assists the injured as they are flown to a nearby hospital.

A Day in the Life of a Nurse (ENC-016456), which chronicles the experiences of obstetrical nurse Teresita Gaceta as she retrieves patients' charts, performs medical interviews, and carries out basic checks on patients. Readers also see nurse Gaceta assist the doctor in the examination room and teach child care classes to new parents.

Choosing a Career in Computers
Series: World of Work

Grades 7-12
1999
Author: Chris Weigant

Ordering Information
The Rosen Publishing Group
29 East 21st Street
New York, NY 10010
(212) 777-3017 / Fax: (888) 436-4643
Toll-free: (800) 237-9932

$17.95 per book (hardcover)
Contact vendor for quantity discounts.

This book, part of the World of Work series, presents options available to people who are interested in careers related to computers. The careers described in the book range from building computers to writing the manuals that explain how to use them. Each career area is discussed in terms of salary and job description. Case studies are used to help readers get a personal perspective of what it is like to work in those fields. Readers reflect upon their own personalities to see if they are well suited to specific jobs. Color and black-and-white photographs are found throughout the text. Terms are defined in a glossary and sources for additional information are listed. (Author/JR) ENC-016330

To the Young Environmentalist: Lives Dedicated to Preserving the Natural World

Grades 6-9
1997
Author: Linda Lauzzi

Ordering Information
Grolier Classroom Publishing Company
90 Sherman Turnpike
Danbury CT 06816
(203) 797-3500x3967 / Fax: (800) 374-4329
Toll-free: (800) 621-1115
www.publishing.grolier.com

$25.00 per book (paperback)

The biographical essays in this book describe how environmentalists became interested and advanced in their fields. The book also suggests factors for readers to think about when considering a career in environmental preservation and protection. It is part of a series that examines how well-known and respected individuals from a variety of fields developed their interest in their careers and reached their current positions. This book begins by explaining how the work of Rachel Carson and Jacques Cousteau popularized environmental concerns. It goes on to profile other environmentalists with varied interests, job descriptions, and locations, ranging from the rain forest to Brooklyn, New York. Some of them work with plants and animals, while others protect archaeological relics. Each profile contains a highlighted box that includes the environmentalist's field of work, education, and words of wisdom. The author uses extended quotes to illuminate each person's point of view. One chapter profiles Jessica Kadel Koelsch, who works to protect manatees at the Mote Marine Lab in Sarasota, Florida. The chapter describes the appearance and behaviors of manatees and explains that their population size is dwindling because of their injuries from boat propellers and red tides. Koelsch explains that she plots the manatees' locations by spotting them from an airplane or boat. She warns readers that there are not many jobs like hers and suggests that if they are interested in pursuing such a position, they should make sure they do well in school and participate in internship or volunteer programs. (Author/JR) ENC-016684

Careers as an Electrician

Series: Exploring Careers

Grades 7-12
1999
Author: Elizabeth Stewart Lytle

Ordering Information
The Rosen Publishing Group
29 East 21st Street
New York, NY 10010
(212) 777-3017 / Fax: (888) 436-4643
Toll-free: (800) 237-9932

$18.95 per book (hardcover)
Contact vendor for quantity discounts.

Part of the Exploring Careers series, this book describes the salary range, job requirements, and job responsibilities related to a career as an electrician. The series provides students with information to help them make career choices. In this book, readers learn about the areas of specialization that are available to electricians. The text outlines the ways in which labor unions have influenced the benefits that electricians enjoy and how those unions represent workers. Case studies are used to show what life as an electrician is like. In one of them, a woman explains her choice to begin a career as an electrician, the special challenges she faces, and the practical concerns of running her own business. Readers learn about job training through apprenticeships and the steps involved in applying for a job. A glossary and lists of additional resources are included. (Author/JR) ENC-016278

Exploring Biology: Careers and Issues

Series: Introduction to Biology

Grade 10 and up
1999

Ordering Information
Cyber Ed Inc.
PO Box 3037
Paradise, CA 95967
Email: cybered@cyber-ed.com
(530) 872-2432 / Fax: (530) 872-2445
Toll-free: (888) 318-0700
www.cyber-ed.com/start.html

$139.95 per CD-ROM package (Mac/Windows)

This CD-ROM introduces students to the possible careers that are available in biology and the social issues that are associated with them. A multimedia presentation of 65 slides uses animated drawings and photographs to illustrate careers and issues. One such animation shows how animals can be used in biological experiments. The program makes distinctions between careers in science and technology and outlines the background concepts and activities of professionals in specialized areas of biology. For example, it discusses the basic biological principles involved in inheritance and genetic engineering before it presents the different kinds of tasks that geneticists perform. Students see a table with a description of the various careers and the educational requirements for each area of biology. Thought-provoking questions require students to think about issues in each biological area. When the Human Genome Project is addressed, for example, students are asked to consider the possible ramifications of people knowing their own genetic predispositions to experience certain health problems. Seven interactive tutorials are available. In one tutorial, students match the names of the different biology disciplines with clues to complete a crossword puzzle. Students may jump to different locations in the program or look up scientific terms in the glossary. (Author/JR) ENC-015448

100 Most Popular Scientists for Young Adults: Biographical Sketches and Professional Paths

Series: Profiles and Pathways

Grade 7 and up
1999
Author: Kendall Haven and Donna Clark
Publisher: Libraries Unlimited, Inc.

Ordering Information
Teacher Ideas Press/Libraries Unlimited
PO Box 6633
Englewood, CO 80155
(303) 770-1220 / Fax: (303) 220-8843
Toll-free: (800) 237-6124
www.lu.com

$56.00 per book

100 Most Popular Scientists for Young Adults
Kendall Haven
Donna Clark

Designed to inspire students, the biographical sketches in this book chronicle the career histories of 100 successful contemporary scientists. The sketches go beyond the major accomplishments to discuss any academic weakness, discrimination, or failure that may have preceded later achievements. The book focuses on scientists from the physical, Earth, and life sciences and from a variety of ethnic groups. Almost one-third of the entries are about women. Students will read about Annie Wauneka, a health activist who eradicated tuberculosis among the Navaho, and Chen Shiung Wu, a physicist who worked on the Manhattan project. Other scientists include Shirley Jackson, the first African American appointed chair of the Nuclear Regulatory Commission; Stephen Hawking, co-creator of the Big Bang theory; and Bill Gates, the founder of Microsoft Corporation. In addition to a narrative life history, each biographical sketch includes a bulleted list of career highlights, a timeline of key dates, and advice for young scientists. The text is illustrated with black-and-white photographs of many of the scientists. Bibliographic references are included in each biography. The appendix contains an extensive list of annotated Internet resources. (Author/LCT) ENC-017279

Real Science!

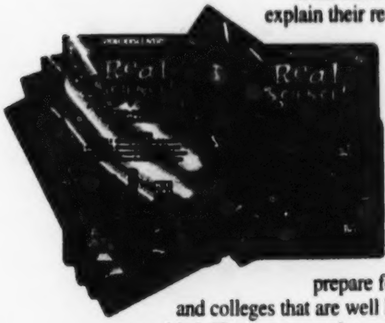
Series: Real Science!

Grades 6-12
1997
Author: producer, designer, programmer, Dann Parks

Ordering Information
Videodiscovery, Inc.
1700 Westlake Avenue North, Suite 600
Seattle, WA 98109
(206) 285-5400 / Fax: (206) 285-9245
Toll-free: (800) 548-3472
www.videodiscovery.com

$139.00 per CD-ROM package (Windows/Mac)
Package includes a 4-volume set with 4 identical users' manuals. Lab packs and site licensing also available. Contact vendor for more information.

Designed for students interested in exploring a possible career in science, this CD-ROM set explains the activities and skills that are involved in 28 careers in science. Each disc focuses on either life sciences, Earth sciences, physical sciences, or health sciences. The program presents an overview of each career first and then allows the user to visit sections called On the Job, Inside Story, or Next Steps. The On the Job section contains video footage showing the featured scientists performing different aspects of their jobs. The program highlights male and female scientists from different cultural backgrounds. They explain their research and are shown in the field, in the laboratory, and at their desks. The Inside Story section contains information about the personality traits, salary ranges, and job options associated with a career. The Next Step section tells students what they need to do in school, in the community, and at home to help them prepare for that career. Lists of books and colleges that are well known in that scientific area are provided. The user manual suggests that the CD-ROMs can be used to show how careers in science can be exciting and to help motivate students who don't see how science relates to their lives. The section about herpetologists, for example, shows a scientist capturing an alligator, tagging it, and pumping its stomach for gut analysis. Students learn that herpetologists often work at night and need good hand-and-eye coordination. The program advises that students need to do well in mathematics and science as well as in English because herpetologists need to effectively communicate their research findings. Facts about the particular scientific fields appear on the screen when a new page is opened. The user manual has blackline masters with summary tables and follow-up questions about each career. (Author/JR) ENC-017371



Real Science!

www.realscience.org

Grades 7-12
1998
Author: webmaster/interactive media developer, Bill Elias

This web site is the online companion to the television and CD-ROM series described above. Ranging from an acoustical research engineer to a wildlife psychologist, the scientists profiled here engage in activities such as hunting for dinosaur footprints, searcing for distant galaxies, and collecting blood samples from elephant seals. Through interactive career exploration, this site aims to inspire a new generation of scientists by introducing students to the world of science. For each career, visitors are given a short description of the science involved in the career along with role models in a discipline, a list of suggested web sites and books, and tips on how students can explore the career as an option for their future. For example, visitors interested in robotics can find out about Thomas Massie at MIT in Boston, who has designed a robotic finger and computer interface that may someday help train doctors treat brain trauma. If students want to learn more about artificial intelligence, they are encouraged to check out the robotics section of the engineering department at their local university, experiment with building robot models, and visit the MIT artificial intelligence lab web site. Winner, ENC Digital Dozen, April 1999. (Author/YK) ENC-014909

Careers in Science: From Archaeologist to Zoologist

Grades 8-12
1997
Author: Cambridge Educational

Ordering Information
Cambridge Educational
PO Box 2153
Charleston, WV 253283
Fax: (800) 329-6687
Toll-free: (800) 468-4227

$79.00 per video

This video surveys the wide-ranging world of science careers, from archaeology, botany, and chemistry to pharmacy, space exploration, and veterinary medicine. Through interviews conducted at the National Youth Science Camp, students and presenters share stories about their goals, research, and other work. Additional interviews with science professionals offer viewers a look at the diverse group of men and women working in science today. The video also describes the aptitude and skills, education and training, and work activities common to science careers. (Author/LCT) ENC-016844

Your Career in Chemistry: Measuring Your Skills, Weighing Your Options

Series: Career Development for Students

Grades 9-12
1997
Author: Mary Pat Marzullo

Ordering Information
American Chemical Society
Orders Department 1195
1155 16th Street NW
Washington, DC 20036
Email: service@acs.org
(614) 447-3776 / Fax: (202) 872-6067
Toll-free: (800) 333-9511
www.acs.org/edresources.html

$20.00 per video

In this video, chemists and students from a variety of ethnic backgrounds offer advice about the skills and traits needed for a successful career in chemistry. Chemists from academia and industry discuss the importance of a broad knowledge base, problem-solving skills, and interpersonal communication skills. They explain why students need to achieve business and computer literacy as well as have practical experience in undergraduate research or on the job. Students are encouraged to allow themselves to be innovative and creative while also accepting the responsibilities of group leaders. The chemists emphasize the importance of finding a mentor who will give students advice about research, courses, and career opportunities. The video explores the question of whether or not it is better to go to graduate school directly after college. It outlines the diversity of careers available for people with chemistry degrees. (Author/JR) ENC-017267

Wildlife Rescue: The Work of Dr. Kathleen Ramsay

Grades 4-6
1999
Author: Jennifer Owings Dewey

Ordering Information
Boyds Mills Press
815 Church Street
Honesdale, PA 18431
Fax: (570) 253-0179
Toll-free: (877) 512-5366
www.boydsmillspress.com

$9.95 per book (paperback)

Wildlife Rescue

This storybook is an account of the daily life and activities of Dr. Kathleen Ramsey, a female veterinarian who runs a wildlife rescue center in New Mexico. Readers meet Dr. Ramsey and her staff, hear how sick or injured animals arrive at her hospital and learn about the medical evaluation and treatment of these animals. If treatment is successful, readers then follow the animal's recovery, rehabilitation and release back into the wild. The book's clear and pragmatic prose objectively portrays the reality of working with seriously injured or dying animals. It describes some of the practical techniques used in veterinary medicine and animal husbandry, but it also touches on the emotional attachments and personal lives of the staff in order to convey their dedication and the joy they feel after the successful release of a treated animal. Rescued animals discussed include eagles, beavers, and fawns. (RJD) ENC-016079 some of the jobs. The development of this package was funded by the National Science Foundation, the Alfred P. Sloan Foundation and the Department of Energy. (RJD) ENC-016716

People Who Took Chemistry, That's Who!

Grades 7-11
1992
Author: executive producer, Martha K. Turckes

Ordering Information
American Chemical Society
1155 16th Street NW
Washington, DC 20036
Email: service@acs.org
(614) 447-3776
Fax: (202) 872-6067
Toll-free: (800) 333-9511
www.acs.org/edresources.html

$24.95 per video and user's guide

"People Who
Took Chemistry,
That's Who!"

Viewers of this video are introduced to graduates who have used the knowledge they gained from a high school chemistry education in their careers. This 15-minute video presents female and male chemists from various ethnic backgrounds describing their work. The video is intended to encourage students to take chemistry at the high school level and to demonstrate the variety of chemistry-related careers through examples of chemistry in industry and in their lives. The program features interviews with nine people doing tasks such as recycling plastics, analyzing environmental pollution, and producing compact discs. The accompanying user's guide provides teachers with a summary of the video, tips on how to prepare students for viewing the tape, and follow-up activities. In sample follow-up activities, students write down a career vignette summary after viewing the video, do research on one particular career or scientist of their choice, and think about their likes and dislikes in terms of their interests and extracurricular activities. In subsequent sample experiments, students actually prepare two polyesters from ethylene glycol and glycerol to compare their properties and return the polymer molecules in a PET bottle to their original structure by heating the bottle gently. The user's guide also includes bibliographic references, audiovisual materials, and the ACS (American Chemical Society) career services, as well as the CHEMCOM career vignettes for the follow-up activities. (Author/YK) ENC-016200

Setquest: Career Discovery in Science, Engineering and Technology

Series: Learning in Motion

Grade 7 and up
1997
Author: Educational Film Center and Consortium for Mathematics and Its Applications, Inc.

Ordering Information
Learning In Motion
500 Seabright Avenue, Suite 105
Santa Cruz, CA 95062
Email: helpdesk@learn.motion.com
(831) 457-5600 / Fax: (831) 459-6876
Toll-free: (800) 560-5670
www.learn.motion.com

$359.00 per CD-ROM package (Mac/Windows)

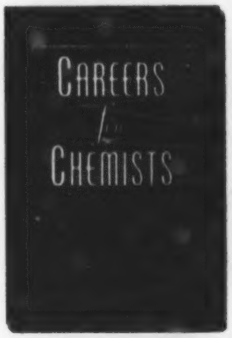
This career information package, comprising eight CD-ROMs and accompanying printed material, is a guide to employment within the fields of science and technology. The CD-ROMs feature an interactive questionnaire that asks students about their interests then searches an online database to suggest an occupation or field that might appeal to them. Students can read a description of the recommended careers that includes information on minimum qualifications, typical pay and projected national demand, as well as supplying the addresses of organizations that students can contact for more information. There are about one hundred and twenty job descriptions in this package and both online and printed versions are included. In addition to the written descriptions, the CD-ROMs include a large collection of informative video segments that further highlight selected career areas. The video segments show scientists and technicians in action and include interviews with workers who describe their daily activities and discuss the pros and cons of their jobs. In a sample video segment, users see an ecologist working on an animal diversity survey project in a South American jungle. In another segment a woman describes her job as a forensic scientist. Navigation around the database is via a simple point and click interface. The printed material includes a glossary and a description of the different qualifications mentioned as requirements for some of the jobs. The development of this package was funded by the National Science Foundation, the Alfred P. Sloan Foundation and the Department of Energy. (RJD) ENC-016716

Careers for Chemists: A World Outside the Lab

Grade 9 and up
1997
Author: Fred Owens, Roger Uhler, Corinne A. Marasco

Ordering Information
American Chemical Society
1155 16th Street NW
Washington, DC 20036
Email: service@acs.org
(614) 447-3776 / Fax: (202) 872-6067
Toll-free: (800) 333-9511
www.acs.org/edresources.html

$15.00 per book (paperback)



Students can use this book to gain an overview of a variety of career areas within the chemical sciences. It features 80 profiles of people who use their training in chemistry in environments other than the traditional research lab. These profiles highlight the paths people have taken and the factors that contributed to their career decisions, as well as a summary of the skills and characteristics needed for each of the 20 careers covered. The book is intended to help chemists who may be facing a job change or career transition. The book begins with an overview of career information such as Career Alternatives and Your Career Toolbox, which is taken from the ACS (American Chemical Society) publications and information presented in the ACS career workshops and seminars. Subsequent chapters on career fields provide an overview of each area, followed by educational requirements, employment outlook, and a list of skills and characteristics needed to pursue a career goal in that area. The profiles within the chapters are separated into two parts: Career Path and Career Advice. Sample career areas include careers in business (manufacturing management, purchasing, and strategic planning), consulting, and government work (forensic laboratory, public safety, and environmental protection), as well as regulatory work, science writing, and technical sales. An appendix also includes bibliographic references, electronic resources, and job listings and directories, as well as the ACS career services. (Author/YK) ENC-015989

She Does Math! Real-Life Problems from Women on the Job

Series: Classroom Resource Materials

Grade 6 and up
1995
Author: editor, Marla Parker

Ordering Information
Mathematical Association of America
PO Box 91112
Washington, DC 20090
(301) 617-7800 / Fax: (301) 206-9789
Toll-free: (800) 331-1622
www.maa.org

$38.95 per book (paperback)

She Does Math!

This book is written for both high school and college students who enjoy math and want to explore potential career paths, as well as for anyone who has ever asked this question: When am I ever going to use this? It presents personal career histories written by 38 professional women. The reader learns how mathematics plays a critical role in careers ranging from environmental psychology to dietetics and engineering. Each history describes how much math the author took in high school and college; how she chose her field of study; and how she ended up in her current job. Each woman presents several problems typical of those she had to solve on the job using mathematics. The purpose of the book is to encourage students to take math every year in high school and to encourage high school and college students, especially women and minorities, to consider technical fields when planning their careers. One of the highlighted careers is the medical specialty of ophthalmology. The author explains that she likes to read and solve mysteries and is fascinated by the precision found in physics and calculus. These interests lead her to a career in ophthalmology and research. The related problems develop several topics in the field that require the application of mathematics, including double vision, prescribing reading glasses, and using eye drops. Solutions to all problems are given. (Author/JRS) ENC-017209

Women of NASA

quest.arc.nasa.gov/women/intro.html

Grades 8-12
1997
Author: managed and maintained by Tish Krieg
Publisher: Ames Research Center

This web site was developed to encourage more young women to pursue careers in math, science, and technology. The Women of NASA interactive project showcases outstanding women who are enjoying successful careers in math, science, and technology. The site offers biographical sketches written by women scientists and engineers working at NASA and descriptions of a typical workday and how they balance their professional and personal lives. Additional resources include a schedule of online chats with NASA women, suggestions for using the site in the classroom, and additional resources about science and technology careers. In sample activities, students research women featured in upcoming chats and prepare a list of questions; use the biographies to make up a game of 20 Questions; and take notes on the chats and use them to construct their own quizzes and puzzles. Winner, ENC Digital Dozen, February 1998. (Author/LCT) ENC-011378

SPACES (Solving Problems of Access to Careers in Engineering and Science)

Series: Math and Career Activities for Elementary and Secondary Students

Grades 4-10
1982
Author: project director, Sherry Fraser

Ordering Information
Dale Seymour Publications
4350 Equity Drive
PO Box 2649
Columbus OH 43216
(800) 237-3142 / Fax: (800) 393-3106
Toll-free: (800) 526-9907
www.pearsonlearning.com

$18.95 per book (spiral-bound)

This book offers a collection of 32 activities designed to strengthen problem-solving skills and increase students' awareness of the relationship of problem solving to scientific careers. Another important goal is to help students become aware of the appropriateness of women's participation in science and to encourage older students to consider a scientific career as an option for themselves. The activities are divided into six categories designed to introduce students to a range of mathematics topics and provide experiences in developing logical reasoning. Design and Construction, for example, emphasizes planning ahead, visualizing different uses of spaces and materials, and making model representations. In these activities, students explore architecture, engineering, and drafting by designing and constructing models of a room, a veterinarian's office, and a park. The Visualization activities develop the ability to analytically examine a pictorial representation of a structure. Students are given optical illusion surveys, flow charting, attribute sorting, and measurement activities. The activities in the Tool category address the use of standard tools. Women in Careers presents the histories of female pioneers in science and technical fields. Other categories help students examine their attitudes about mathematics and present a group of activities to inform students about job requirements and definitions. For each activity, the book includes a summary of required skills, class time, and materials, as well as teacher instructions, reproducible worksheets, and answer keys. (Author/LCT) ENC-017010

The Space Publications Guide to Space Careers

Grades 5-12
1998
Author: Scott Sacknoff and Leonard David

Ordering Information
Space Publications
PO Box 5752
Bethesda, MD 20824
(703) 524-2766 / Fax: (703) 524-2767
www.spacebusiness.com

$18.95 per book (paperback)

SPACE
CAREERS

This resource guide, developed for grades 5-12, provides an overview of the space industry that highlights how it is organized and what types of positions exist. The purpose of the book is to assist readers in their employment search. The book begins with an overview of the activities the space industry encompasses and the history of the space industry. Subsequent chapters discuss the structure of the space industry (commercial space, civil space, military space, and academic community), opportunities within the space industry, and the resources that are available to aid readers in their search for a job. The book also provides details on university programs with an emphasis on space, space related fellowships and scholarships, and networking opportunities. In a sample chapter, readers learn about job descriptions and positions in such fields as telecommunications, satellite design and manufacturing, and launch operations, in addition to remote sensing, medical and biotechnology, and global positioning systems. A glossary, an index, and a list of commercial organizations involved with space are also included. (Author/YK) ENC-017350

Sloan Career Cornerstone Series

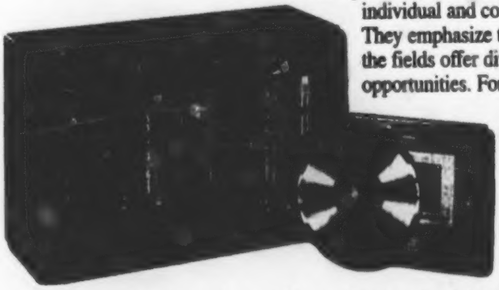
Series: Sloan Career Cornerstone

Grade 6 and up
1998
Author: American Institute of Chemical Engineers et al.

Ordering Information
Kendall/Hunt Publishing Company
4050 Westmark Drive
PO Box 1840
Dubuque, IA 52004
Fax: (800) 772-9165
Toll-free: (800) 770-3544
www.kendallhunt.com

$250.00 per set (9 videos)
$350.00 per CD-ROM package

This video series explores career paths for engineering, mathematics, and physical science graduates. The videos feature men and women from a variety of cultural backgrounds discussing the characteristics of their fields as well as the paths they followed to their current positions. Viewers can see examples of people with bachelor's, master's, and doctoral degrees working in industrial, government, and academic settings. The videos show people in their typical daily activities and provide examples of ways that the jobs entail both individual and collaborative efforts. They emphasize the fact that all of the fields offer diverse career opportunities. For example, the program about geoscientists highlights people who work in areas ranging from mineralogy to weather. The people comment on the fact that they enjoy working outdoors and solving problems. Many of them mention that they are interested in acting as stewards of the planet. In the mathematics video, people talk about how they are drawn to the precision of their work. Two men discuss the benefits of their mentorship relationship. Other videos reinforce the idea that internship experiences are valuable in developing the students' skills, helping them to better understand the nature of the field, and giving them work experience to discuss when they apply for their first job. (Author/JR) ENC-017718



Career Exploration Guide

Series: Connections: Linking Work and Learning

Grades 9-12
1996
Author: Dionisia Morales

Ordering Information
Northwest Regional Educational Laboratory
101 SW Main Street, Suite 500
Portland, OR 97204
Email: products@nwrel.org
(503) 275-9519 / Fax: (503) 275-0458
Toll-free: (800) 547-6339
www.nwrel.org

$19.95 per set

This student guide and accompanying staff guide were developed to help teachers and program coordinators structure meaningful student career explorations that integrate work site and classroom learning. The series is designed to facilitate work-based learning so that youth make informed choices and experience success in the world of work. The staff guide states that career exploration gives students a chance to learn about careers through hands-on workplace activities that are integrated with learning at school. In this program the students have an opportunity to observe and interact with workers over a period of 10 to 30 hours. The guide differentiates career exploration from career development and other forms of work-based learning. Divided into separate sections for the program coordinator and the teacher, the staff guide contains fact sheets, forms, and activities to help plan and implement the students' explorations. Included are overviews of processes such as assessing student interests, placing students at work sites, and handling logistical issues. In addition, this guide discusses the components in successful orientation for the students, their parents and guardians, and the work site supervisors. It also discusses how to integrate the students' workplace experiences with the classroom curriculum and how to help students through their guide. A tools section explains the forms and exercises in the guide. Reproducible blackline masters of those forms are provided. A glossary defines terms used in the guide as well as others related to work-based learning. The student guide has assignments that structure the students' learning before, during, and after their time at the work site. As an example, one exercise that students are to perform during their exploration is an interview with their career exploration supervisor. The guide offers a list of questions and forms to record responses and notes. (Author/JR) ENC-017583

Careers in Math: From Architects to Astronauts

Grades 5-9
1994
Author: producer/director, John O'Neill; writers, Rosemary Keogh O'Neill, John O'Neill

Ordering Information
Human Relations Media
41 Kensico Drive
Mount Kensico, NY 10549
Fax: (914) 244-0485
Toll-free: (800) 431-2050
www.hrmvideo.com

$125.00 per video package

This video is designed to be of interest to all students, regardless of their grade or skill level. The kit includes a video, the Teacher's Resource Book, and a newspaper. The video, hosted by two students, begins with the assertion that many students suffer under the misconception that mathematics is boring because they do not see its practical value. They imagine themselves seeking jobs after graduation that don't require skill in mathematics. Several ordinary and extraordinary careers are then presented, with a brief statement of the type of math required. The video also intends to motivate students by examining prejudices about math. The Teacher's Resource Book contains guidance on how to implement the program, suggestions for classroom strategies, reproducible worksheets, and answer pages. The worksheets are designed to show real-world applications of math and to develop career awareness. For example, some worksheets present a career, describe what a person in that career might do from day to day, and present problems for the students to solve. The newspaper is the same one featured in the video, and is designed to extend the reality of the scenarios presented. (Author/SXA) ENC-005787

Corporate Culture and the Attack on Higher Education and Public Schooling

Series: Fastback

Grade K and up
1999
Author: Henry A. Giroux

Ordering Information
Phi Delta Kappa, Inc.
PO Box 789
Bloomington, IN 47402
(812) 339-1156 / Fax: (812) 339-0018
Toll-free: (800) 766-1156
www.pdkintl.org

$3.00 per booklet
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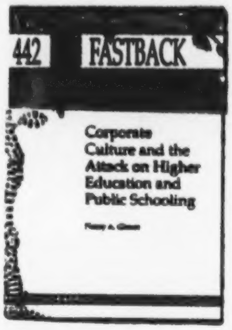

442 FASTBACK

Corporate Culture and the Attack on Higher Education and Public Schooling

This booklet, part of the Fastback series for educators, discusses how a rise in the corporate culture's power has influenced democracy, specifically in terms of education. The series, which is published by Phi Delta Kappa, is intended to present focused, authoritative treatments of topics currently of interest to educators and other readers. The publisher recommends their use for both professional development programs and personal reading. In this publication, the author presents evidence that public education institutions formed potentially unhealthy relationships with corporations because they lost federal financial support at the end of the Cold War. He questions the wisdom of using business models to organize educational systems. Business leaders are quoted as saying that schools should be industrialized and that tenure and intellectual freedom should be abolished. The booklet explores privatization of schools and provides examples of the marriage of commercialism and pedagogy. It mentions a curriculum developed by Exxon that teaches that the Valdez spill was an example of environmental protection. The author calls for the organization of educators and others into groups that challenge the encroachment of corporate power into education. He states that this resistance will protect a system in which education is affirmed as a political process that encourages people to identify themselves as more than consuming subjects and democracy as more than a spectacle of market culture. (Author/JR) ENC-017396

Reschooling for the Future: Restructuring American Education

Grades K-12
1991
Author: video production, Jolie Barbiere

Ordering Information
National Alliance of Business
Publications Orders Department
PO Box 753
Waldorf, MD 20604
Email: info@nab.com
(202) 289-2847 / Fax: (301) 843-0159
Toll-free: (800) 787-7788
www.nab.com

$50.00 per video

This video was developed to help viewers see the importance of business, education, government, and community leaders working together to make schools better. It features government officials, educators, and business leaders explaining how a new view of education is required to meet the demands of modern society. The video begins with a historical look at the way the education system in the early 1900s mirrored the manufacturing industry, with teachers giving information to students on an "assembly line of learning." It points out that businesses are retooling to meet customers' needs and that schools need new strategies to meet the individual needs of students. The video states that new strategies can only be implemented if managers in the system have a change of thinking. Three aspects of education restructuring that reflect business restructuring identified in the program are decentralization, training, and technology. The video shows examples of schools where the teachers and the princi-

pals have greater control over what is taught. It discusses how the educators, when they are given greater accountability and responsibility, are more motivated to try new methods. Teachers discuss how these new responsibilities require additional time for training and preparation. Math, science, and language arts are fields that the video identifies as receiving the most benefit from better use of technology. It states that the technology allows the students to learn at their own pace and reach their individual goals. Former President Bush concludes the program with an overview of the America 2000 Initiative. (Author/JR) ENC-017007

The Business of Education Standards

Series: Standards Mean Business

Grades 9-12
1996
Author: Gallina Bricker
Publisher: The Business Coalition for Education Reform

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PO Box 753
Waldorf, MD 20604
Email: info@nab.com
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www.nab.com

$25.00 per video

This video, part of the Standards Mean Business series, provides examples in which businesses have become involved with education through writing new standards, mentoring teachers and principals, and providing opportunities for students to experience the workplace environment. It emphasizes the idea that the ability to learn for a living is key to increasing corporate, community, and individual success. The video highlights interactions that companies such as The Baltimore Sun, Techtronix, and Boeing have had with their education communities. Business people discuss their beliefs that high school diplomas are not meaningful in terms of business readiness because they do not represent an education that has been based on standard objectives. One businessman comments that his business has improved to meet the demands of the customers. He now sees that the demands on students will motivate them to reach higher standards. The video compares preparing for a basketball game to preparing for a career. It states that, just as high school basketball players would not think of playing with the basket at a level lower than that used for professional basketball players, so students should learn their skills so that they can also strive to compete at workplace levels. The accompanying video guide explains the business initiatives, The Maryland Business Roundtable for Education and The Oregon Business Council. It suggests using the video to jump-start discussions with community, business, and education groups. The guide lists addresses of organizations that can provide additional information on business education partnerships to promote education reform. (Author/JR) ENC-017008

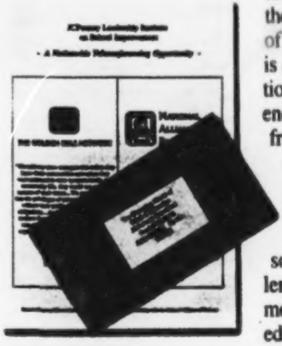
Understanding the Changing Nature of Work and Education

Series: JCPenney Leadership Institute on School Improvement

Grades K-12
1995
Author: JC Penney Golden Rule Network with the National Alliance of Business
Publisher: JCPenney Leadership Institute on School Improvement

Ordering Information
National Alliance of Business
Publications Orders Department
PO Box 753
Waldorf, MD 20604
Email: info@nab.com
(202) 289-2847 / Fax: (301) 843-0159
Toll-free: (800) 787-7788
www.nab.com

Video and guide are **free**. To get the set you must specify that you want both the tape and the guide.



This video and program book are designed to help workshop participants understand the changes that are cuurently taking place in business and education, identify ways for school and business partnerships to address these changes, and gain tools to build and strengthen these partnerships through business experience and expertise. The video and program book are to be used together to foster discussions in a workshop setting. The video contains two segments. The first segment is a program that provides examples of the changes that have taken place in education and the business world, including how each responds to the new roles of customers and students, the changing role of the boss and teacher, and the importance of team work. The second part of the video is a panel discussion that includes questions from the studio and viewing audiences. The panel consists of representatives from both the business and education communities. The members of the panel emphasize the ways that technology has changed how both communities function. They also stress the idea that society's views of competition and excellence need to change. One panelist commented that the interests of businesses and educators have grown together and their goals have become a civic matter. The program book explains the ways that the business world has evolved and the increasing value of employees who are able to continue learning throughout their careers. It points out that the skills employers are seeking result from educational systems that promote active learning. The book explores the relationships between the schools and their district offices and business partners. Tools are provided to build mutual awareness between business and education leaders. (Author/JR) ENC-017127

Quality in the Classroom: How Students and Teachers Co-Manage Their Learning Processes

Series: JC Penney Leadership Institute on School Improvement

Grades K-12
1999
Author: JC Penney Leadership Institute on School Improvement and National Alliance of Business

Ordering Information
National Alliance of Business
Publications Orders Department
PO Box 753
Waldorf, MD 20604
Email: info@nab.com
(202) 289-2847 / Fax: (301) 843-0159
Toll-free: (800) 787-7788
www.nab.com

The video and guide are free but there is a $10.00 shipping and handling fee. To order the set use order # 7049.

This video and participant's guide, which represent the seventh session of the JC Penney Leadership Institute on School Improvement, explain a method designed to improve learning by changing teaching methods to be more student-centered using quality management techniques, adjusting expectations of education and business partnerships, and assessing district and classroom learning systems. The missions of the Institute are to make business leaders better partners by enriching their knowledge of how schools operate, and to provide educators with business expertise that enhances their decision-making capacity. This session focuses on how the Baldrige Criteria for Performance Excellence can be used to align educational reform initiatives and develop models for education and business partnerships to improve classroom learning. The Baldrige Criteria constitute an organizational system based on the following seven categories: leadership, strategic planning, customer and market focus, information and analysis, human resource focus, process management, and performance results. The video contains footage from an elementary school and a high school that follow quality management techniques with the Baldrige Criteria. The teachers, students, and administrators discuss how the system helps them meet state standards, involve parents, and collaborate with businesses. They show how they have transformed their classes, made action plans, and assessed student achievement. First-grade students discuss how their skills have improved throughout the year and compare their achievements to their customer expectations. Panelists, who were highlighted in the classroom footage, answer questions from the moderator, studio audience members, and viewers at home. Topics addressed include student group management techniques, authentic performance tasks, and rubric development. In response to questions about teacher training, panelists describe the quality management boot camp. The participant's guide provides guidance for workshop facilitators, gives background information about the components of the quality management system, and explains how the system has worked with specific examples. In this system the students are active workers whose product is their learning. Because they use this product to enhance their employability and competency, they are also considered to be customers. The guide offers ten guidelines that suggest how business leaders, who have implemented quality improvement initiatives in their own companies, can share their experiences with their education partners. Three assessment tools are provided to help business and education partners reinforce their own community improvement systems. (Author/JR) ENC-016241

Quality
in the Classroom
Students and Teachers
Their Learning Process

What Manufacturing Workers Need to Know and Be Able to Do...

Grade 9 and up
1997
Author: conducted by the National Coalition for Advanced Manufacturing for the U.S. Department of Education

Ordering Information
National Coalition for Advanced Manufacturing
1201 New York Avenue NW, Suite 725
Washington, DC 2005
(202) 216-2743 / Fax: (202) 289-7618
www.nacfam.org

$49.00 per book (paperback)

What manufacturing workers need to know and be able to do . . .

In this project report, the National Coalition for Advanced Manufacturing presents the Skill Standards for Advanced High Performance Manufacturing and discusses their value to educators, students, workers, employers, and parents. The project's goal is to create a tool set and methodology for improving the way new workers' skills and knowledge are aligned with the current and future needs of the workplace. The report explains how the standards can be used as tools to complete tasks such as improving manufacturing processes, hiring new employees, and creating job skill profiles. The skills statements identify what a competent skilled worker can do. The standards represent an expansion of the skill statement to include the condition, context, criteria, and forms of documentation related to their attainment. Also in the report is the historical background of the creation of the standards. The appendix explains the framework of the standards and contains definitions of terms. (Author/JR) ENC-017824

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